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Plant of Henry Vogt Machine Company

Modern Equipment of the Works at Louisville, Ky., for Making Refrigerating Machines and Equipment, Boilers, Tanks, Etc.

BY G. D. CRAIN, JR.

The average member of the machinery trade, unless he is intimately acquainted with the big shops of the South, would be inclined to say, merely as a reflection of a general impression on the subject, that metal-working practice is not so well standardized below the Mason and Dixon's line as it is elsewhere, and that a modern shop in that section is the exception rather than the rule. As a matter of fact, however, manufacturers of machinery in the South have been coming to the front with rapid

ments of any kind. The lines turned out include ice machinery, water-tube, return-tubular and internally fired boilers, driers and filter presses, gray iron foundry castings and drop forgings.

The original plan of the buildings contemplated the addition of 20-ft. bays to each structure, and this has been done until the floor space has been practically doubled. The idea adopted at the start by Mr. Vogt, of having everything on the ground floor, and of placing



View of the Boiler Shop Typical of Present Day Generous Natural Illumination

strides during the past few years, and it is by no means difficult to find plants which are models in their respective fields, both from the standpoint of equipment and method of operation. In this class belongs the plant of the Henry Vogt Machine Company, Louisville, Ky.

The concern was established in 1880 as the Sulzer-Vogt Company, the present style being adopted after a few years. Henry Vogt, the present head of the business, was one of its founders, and has witnessed a steady growth of the industry. The plant has profited from the fact that it was designed for the work it is now doing, so that it has not been necessary to use makeshift arrange-

ments in any department, and it is by no means difficult to find plants which are models in their respective fields, both from the standpoint of equipment and method of operation. In this class belongs the plant of the Henry Vogt Machine Company, Louisville, Ky.

A marked opportunity for the proper design and arrangement of buildings has resulted from the fact that plenty of room has been constantly available. The plant covers 15½ acres, running from Seventh to Eleventh streets and from Ormsby avenue south to St. Louis avenue. Nine buildings are employed for the various classes of work, and each is practically a separate factory in itself although supplied with power from one central source.

The general office building is a two-story brick structure, the first floor being used for the work of the general office and sales force. On the upper floor is the laboratory, used for testing materials. This is adequately equipped for this important work. The engineering department, of which S. Thurstensen is chief, is also quartered here, a large force of designers and draftsmen being employed. Not only is this department in charge of the design of ice machinery and boilers, as well as other products of the company, but it also plans buildings, special machines and other equipment and appliances used by the concern in its manufacturing operations.

A feature of the general office building is a dining room, where the office force and foremen of the various departments in the plant are provided with luncheon daily, the plant being a considerable distance from the central portion of the city. About 40 persons are served here each day.

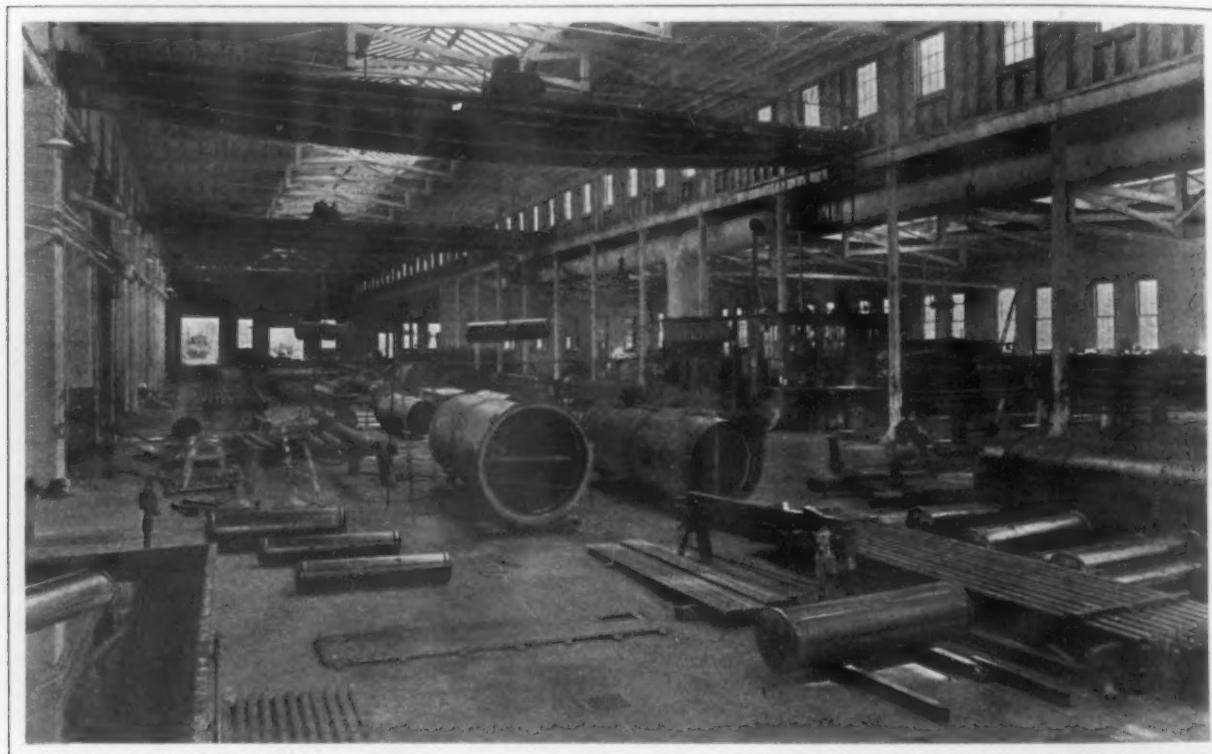
The power plant has a capacity of 750 kw. Three Vogt water-tube boilers, two with a capacity of 300 hp. each and one with a capacity of 500 hp., generate the steam. The engines comprise two 150-kw. Skinner auto-

some live steam has to be utilized for this purpose. Arc lights are placed throughout the grounds, while the buildings are lighted with flaming arcs.

The plant is located on "The Hub," as a switching system available for all roads entering the city, nine in number, is called. The plant is so arranged that switches from the outside enter it at sufficiently numerous points to allow material to be delivered under cover in all cases. In the case of sheet steel, for instance, which is often piled without protection on account of lack of facilities of this kind, it is unloaded directly from the cars in the part of the boiler department reserved for this purpose, the disadvantage of rusting and the inconvenience of having the material exposed thus being done away with.

In addition to this, material is moved from one portion of the plant to another as needed by means of a locomotive crane built by the Industrial Works, Bay City, Mich. A mile of standard-gauge tracks has been built for the operation of this equipment, as well as a mile of industrial tracks used by the company's trucks, which are hand-operated.

The boiler shop is 1000 ft. long by 100 wide. It is



View in the Ice Machinery and Testing Department, Showing the Heating Conduits

matic engines and one 450-kw. Nordberg Corliss engine, the latter having only recently been installed. Three generators made by the James Clark, Jr., Electric Company are direct connected to the engines. The machinery throughout the plant, with the exception of special units, such as steam hammers, is motor-driven, individual drive being used almost exclusively. There are some small machines which are driven in groups on account of their reduced requirements.

All of the buildings are of the same general construction, being of the steel frame, brick veneer type, with saw-tooth roofs, the general use of this plan having resulted in ample lighting provision, so that a minimum of artificial light is necessary. This is another result, of course, of the plan of having all the work on the ground floor. The buildings are of fireproof construction.

Special provisions for fighting fire have been made, a chemical engine having been installed and picked men in various sections of the plant trained in its handling. There are a number of fire-plugs located at strategic points throughout the plant, with an ample supply of hose, so that the danger of fire has been reduced to the minimum.

The buildings are lighted and heated from the central plant. The heating is done with hot air, the Sturtevant fan system being used. Exhaust steam supplies the heat for the most part, though during part of the cold season

equipped with two electric cranes of 10 tons' capacity each, and a complete line of boiler machinery, including two hydraulic riveters, a Hilles & Jones bending roll capable of taking a plate 16 ft. x $\frac{3}{4}$ -in., in addition to a number of other rolls; besides punches, bevel shears, etc. The cranes in this and other departments were made by the Pawling & Harnischfeger Company. The machinery in this department is all motor-driven. The company handles all of its tank and plate steel work, which has become a considerable feature in addition to regular boiler construction, and it is also equipped to do structural iron work here.

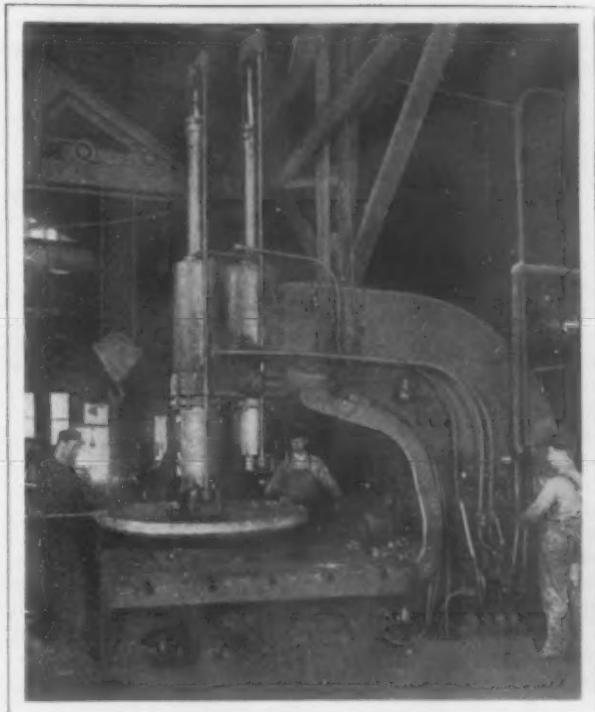
The foundry has a capacity of 60,000 lb. a day, and frequently produces castings as large as 14 tons. The equipment includes air tools, hydraulic tools, molding machines of various designs, and two electric cranes of 10 and 15 tons' capacity, respectively. This department produces ammonia valve fittings, boiler fronts, grate-bars, large pipes for ammonia generators, cast columns and plates for structural work and other castings needed in the manufacture of ice machinery and boilers. The foundry has complete facilities for core-making, and is equipped with a sand-blast for cleaning the castings. Devices for reclaiming the iron from the slag are a feature of the foundry work. Electric hoists are used in the cleaning department. Steel scrap from the machine shop

and other sections of the plant are used in the melt of the foundry, resulting in the production of superior castings of semi-steel composition. The foundry building is 150 x 300 ft. in dimensions, the design of the building being typical of the entire plant, with steel frame and saw-tooth roof.

Adjacent to the foundry is the pattern department, the same building containing the pattern storage room. The pattern shop is equipped with the usual machinery for this work, including saws, mortiser, lathe, etc. The company has an effective system in use in the storage of patterns, each pattern being marked according to its kind and location in the building, and the facts concerning it being shown in a card index. Thus it is possible for any pattern desired to be located by turning to the index and getting the data as to its location in the building. The pattern storage building is well separated from the manufacturing departments, and is a 3-story brick building 70 x 70 ft. Its segregation was largely with a view to the fire hazard.

The machine shop is 100 x 250 ft. Its two electric cranes have a load capacity of 10 tons each. All tools are of high-speed design, the latest and best machines having been added to this department. The equipment consists of lathes, boring, shaping and radial drilling machines, hydraulic presses, etc. The latter handle material with a maximum diameter of 78 in. Much new machinery has been added during the past year for boring and tapping drop forgings for valves and fittings. An instance of this was the installation of machines capable of quick drilling and tapping 2-in. forged steel ell. In this department are manufactured steam pumps for ammonia work, as well as ammonia valves, fittings, etc., for the ice machinery. There is also a complete die-sinking department, where dies are manufactured for forging work. Tools used in the ice factory in connection with the special machinery are also produced in this shop.

Adjoining the machine shop is the storage room, a two-story building, 50x100 ft. Parts for ice machinery are carried in large quantity. Up-to-date methods have been applied for keeping sufficient stock without putting too great a load on the plant. A record of the parts on hand is kept by means of a card system, this being corrected daily as stock is withdrawn or added to the amount already on hand. The embarrassment of occasionally running out of a certain line of parts has thus been obviated. An electric elevator is used in this building for the rapid



Heavy Flanging Press

handling of material, while trucks connected with all of the shops, especially the machine shop, convey it as needed.

The ice machinery assembling and erecting department is housed in a building 150x400 ft. Two electric cranes, of 10 and 20 tons' capacity, respectively, are used in this department, where welding, coiling and testing, by both air and water, are carried on. Welding is done both by the oxy-acetylene and oil methods, the latter supplying heat for a furnace which is used in the operation. Welding is especially desirable in high-pressure ammonia work, on account of the danger of leakage at rivet holes. Pipe-cutting and pipe-tapping are also provided for in this department, which is further equipped with machines for expanding tubes, welding ends in tubes, such as old boiler tubes, etc. This being the department where much of the finished work is set up and shipping arranged for, a railroad track scales is installed here, in addition to one on the main switch, as a check on the weights furnished by the carriers.

The ice can department is particularly interesting by reason of the advanced methods in use. In the Vogt plant machinery has taken the place of practically all hand operations. Galvanized sheets are punched at one stroke, bent in a power brake, riveted by machinery, the bottoms formed mechanically and the holes punched in the same way. Each side of the bottom is riveted at one stroke of the machine. The bands are welded and riveted on, and a solder bath is used instead of a soldering-iron, hand manipulated. Electric welding equipment is to be placed in this department for welding the bands and other light material and is expected to give especially quick results. Indicating the effort which is made to keep this as well as other parts of the plant up-to-date, the company recently installed \$6,000 worth of machinery in order to save 10c. a can in labor. As the department capacity is 200 cans a day, the value of the investment is apparent.

The forging department is equipped with five steam drop hammers, the largest of which has a capacity of 3000 lb. Trimming and flanging presses are installed, the latter being used for flanging boiler heads, lugs, braces, etc., and in the manufacture of drop-forged man-heads and hand-hole plates for boilers and tank work. This is one of the recently equipped departments of the plant and is likewise one of the most modern that can be found in the drop forging business.

The woodworking department occupies a building 100 x 200 ft. The department manufactures lids for brine tanks, traveling cranes for ice tanks and flasks for foundry work, as well as timbers used in the plant or in ice manufacture or handling. Oak and yellow pine are prin-



One of the Stations for Acetylene Welding Operations

cipally employed, about 250,000 ft. being carried on the yard. The lumber is not kiln-dried, air seasoning having been found best for its purposes. The equipment consists of rip-saws, cross-cut saws, planers, boring machines, etc., all individually motor-driven.

The 600 to 800 men employed in the plant are well taken care of. In addition to providing for maximum comfort and efficiency by good lighting and heating systems, the company has also installed individual lockers and modern wash-rooms equipped with the best of plumbing fixtures. Though every effort is made to prevent accidents, all of the machinery employed being guarded as far as possible, provision is made for mishaps by the services of a first-aid-to-the-injured employee whose duties correspond to those of an interne in a hospital. Besides being trained to apply prompt assistance, he is in charge of a stock of rolls, bandages, antiseptic material, etc., so that the injured workman may be well taken care of pending the arrival of a surgeon.

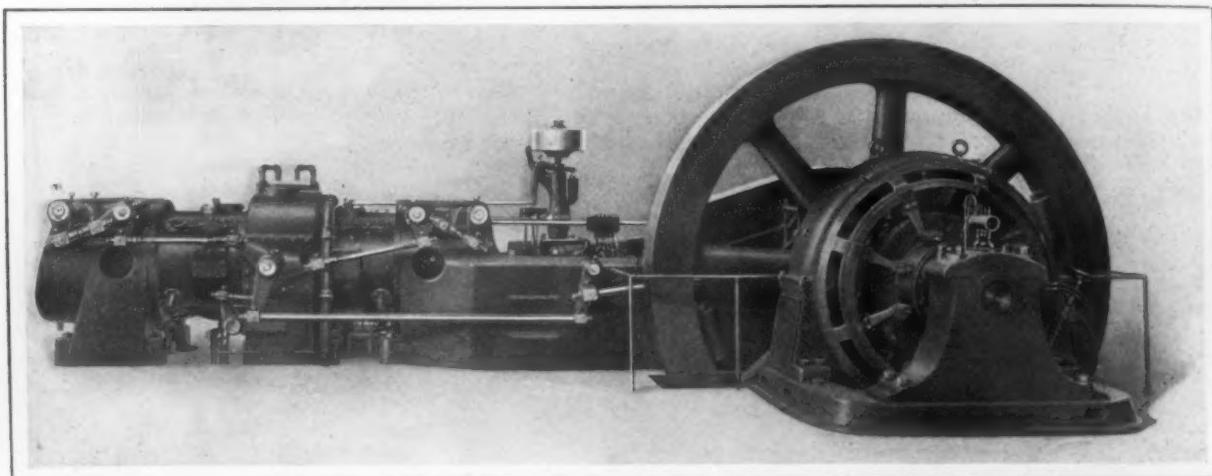
The Vogt business is well organized, 24 different departments accounting for its varied activities. The fact that all of its departments are engaged in producing material used in the company's own product is an advantage in securing evenly distributed operations, the natural peaks and valleys of jobbing work, which it does in some volume, being leveled by the constant demands of its own business. Its cost-accounting system is unusually complete and accurate, while its sales, purchasing,

A Double-Acting Two-Stroke Gas Engine

An American Product for Electric Generators, Blowing Tubs, Rolling Mills, etc.

A gas engine with a double-acting cylinder operating on the two-stroke cycle and intended primarily for driving electric generators, blowing tubs, rolling mills, pumps, compressors and for other heavy duty service is now being made by the Reading Iron Company, Reading, Pa. In the two-stroke engine an auxiliary pump forces into the cylinder, first, a stratum of scavenging air, and then, immediately following, the explosive mixture body. This supply of scavenging air occurs when the exhaust ports are open. After charging the cylinder, the exhaust ports are again covered by the return of the piston and the working charge is compressed. At the instant of maximum compression, the charge is fired by means of an electric spark, and the piston is driven forward under the resulting explosive pressure until the end of the expansion stroke is reached, when the exhaust port is re-opened and the cycle is repeated. A double-acting two-stroke engine imparts two power impulses for every revolution.

A feature of the engine is the arrangement for charging the power cylinder. It consists of a double-acting pump attached to the engine as shown in the smaller of the two illustrations and arranged to produce the results commonly obtained with the two-cycle engine by separate air and gas pumps. It has independent head end and crank end con-



The Gear Side of the Illmer Gas Engine Built by the Reading Iron Company

engineering and other departments are carefully organized. H. E. Barrett is sales manager. A large export business has been developed, with shipments to China, Japan, India, Cuba, Central and South America and Canada. Henry Vogt, the founder of the company, who has had an unbroken connection with the business since its establishment in 1880, is president of the corporation, and Adam Vogt is secretary and treasurer.

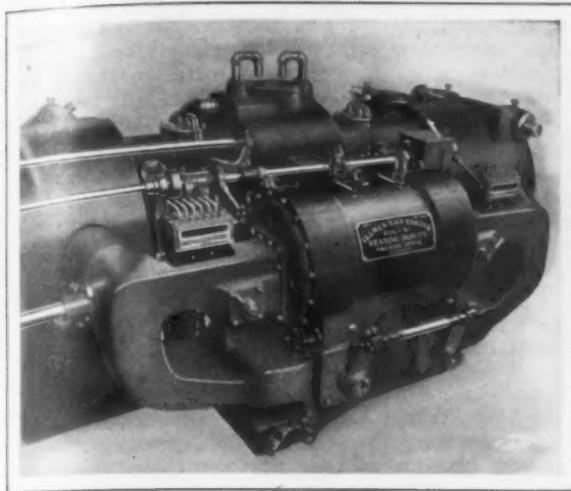
Japan's Steel Works Now Profitable.—According to the Deutsche Japan-Post, the Imperial Steel Works of Japan has been operating at a small but increasing profit in the past few years. The loss in 1909 amounted to 800,000 yen, but in 1910 there was a profit of 50,000 yen and in 1911 of 1,540,000 yen. The official figures for 1912 were expected to reach 2,000,000 yen. The production of the works is given as 100,000 tons for 1909, 160,000 tons for 1910 and 180,000 tons for 1911.

Since April 1, 60 concerns in Cleveland, Ohio, have insured their employees under the provisions of the workmen's compensation law by contributing to the State insurance fund. These include some of the largest companies in the city engaged in metal working lines, among them being the Cleveland Hardware Company, Upson Nut Company, Wellman-Seaver-Morgan Company, King Bridge Company, the five Ohio plants of the American Stove Company, including three in Cleveland and others in Lorain and Bedford, the Johnston & Jennings Company, Walworth Run Foundry Company, Foster Nut & Bolt Company and Madison Foundry Company.

ducts of similar construction. Each conduit comprises an air duct and a gas duct, which communicate with the pump and discharge to common mixing ports located adjacent to the inlet ports of the power cylinder. A suction valve is arranged to admit gas into the gas duct and by means of control devices the pump is made to suck a stratum of gas into the gas duct, where it is held in a body. This gas is not mixed with air until it is blown out of the duct and reaches the mixing ports. The suction valve simultaneously admits air alone into the pump chamber. During the entire period of inlet closure, a body of scavenging air is maintained back of the inlet valve, which when opened discharges the scavenging air into the power cylinder. The body of gas is then blown out of the gas duct, and, just prior to reaching the inlet port, meets and is mixed with a portion of the air simultaneously discharging from the air duct. The explosive mixture thus formed passes into the power cylinder as a working charge. Identical operations are brought about in the other end of the pump.

Considerable emphasis is placed on the arrangement for spreading the fuel charge delivered into the cylinder. The inlet part is commanded by an annular poppet valve placed symmetrically around the cylinder axis and mounted to slide in a suitable housing. The inlet valve, when open, acts essentially as a baffle across the line of flow of the incoming charge and causes the working charge, it is explained, to spread in a hollow cone-like formation as it enters the power cylinder. There is also an offset in the concentric cylinder head wall, arranged to be struck by the motive fluid, resulting in an eddy-whirl, calculated to reduce the high initial velocity acquired by the incoming charge and causing the charge to spread evenly over the entire cylinder.

area. As a consequence, a high degree of stratification is secured, it is stated, and the gas is effectively prevented from escaping through the exhaust ports and the cylinder.



Charging Pump of the Illmer Gas Engine

may become filled with an explosive mixture to the maximum of its volumetric capacity. This is found to result in an almost complete elimination of hot pockets of exhaust gases and remarkable freedom from troubles of pre-ignition and back-firing. It is stated that the inlet port opening may readily amount to 25 per cent. of the piston area, and that a pressure of 1 to 2 lb. per sq. in. is sufficient to drive the working charge into the cylinder. This results in keeping the pump work low, being less than 5 per cent. of the rated indicated power of the engine as shown by a pump card taken at 700 ft. per min. piston speed of the engine.

The exhaust ports of the cylinder are uncovered by the piston as it approaches the end of its expansion stroke. The piston performing the function of an exhaust valve makes exhaust valve gear unnecessary, and the exhaust port opening being unrestricted, it is emphasized that any carbon crust or other deposits may be blown out of the cylinder.

The engine has been developed by Louis Illmer, Jr., who since 1909 has been in charge of the engine department of the Reading Iron Company. It is built in sizes of 300 b.h.p. and upward, and one of the engines has been operating the Scott works of the Reading Iron Company for something over a year. Previous to that time the engine was carried through a series of tests and underwent modification in design, with the idea of working out reliable details.

Further details might here be given regarding the inlet valve gear; the cylinder head construction; the piston construction, which is made in two parts admitting ready cleaning of the interior where the cooling water flows; the method of general lubrication; the accessibility and other details of construction, and the methods of speed regulation by a single throttle valve which controls the flow of gas, but the company has prepared for distribution an illustrated bulletin devoted to the engine. The Reading Iron Company is also builder of gas producers of the rotating-grate and vaporizer type and makes tar and dust extractors for gas power plants.

The Metal Treating & Equipment Company, United States Rubber Company Building, New York, has issued a copyrighted pamphlet of 24 pages describing its galvanizing process under the title "Protection of Iron and Steel Against Corrosion." This process consists in depositing zinc on iron, cold, by means of electrolysis and, therefore, called electrogalvanizing. The pamphlet discusses the features of the company's process in comparison with hot galvanizing and Sherardizing. It is prepared to galvanize samples and to install plants guaranteeing duplication of results. A long list of articles is given for which this galvanizing process is claimed to be well suited.

The Bureau of Standards, Washington, D. C., has now ready for distribution samples of acid open-hearth steel with 0.8 per cent. and 1.0 per cent. carbon, the fee being \$2 per bottle holding about 150 grams.

Radically New Grinding Machines

Norton Grinding Company's 50-Ton Roll Grinder and Its Surface-Grinding Machine

The Norton Grinding Company, Worcester, Mass., gave a demonstration at its shops, May 14, of what is believed to be the heaviest roll-grinding machine in existence. It was built for the National Tube Company, to be installed in the works at Lorain, Ohio. There was a large attendance of engineers and machinery builders, who saw a massive roll in process of grinding. Tests with a Brown & Sharpe straight edge proved that the grinding was absolutely straight, while tests for roundness showed a variation between one-quarter and one-half of a thousandth of an inch.

The new Norton surface-grinding machine was also shown for the first time. The design possesses a number of interesting and somewhat radical features. It will be built to grind 15 in. wide and 15 in. high, with lengths of table 6, 8, 10, 12 and 14 ft. The machine shown had a 14-ft. bed.

The details of the roll-grinding machine are as follows:

Total weight of machine, 100,000 lb., or 50 tons; size of grinding wheel, 24 in. in diameter, 8-in. face; weight of grinding wheel, 200 lb.

The machine is equipped with five electric motors: One 40-hp. motor for revolving the grinding wheels and grinding wheel carriage; one 15-hp. motor for revolving the rolls; headstock and footstock equipped each with one 2-hp. motor for moving them along the ways to the different positions required; one 2-hp. vertical motor for revolving the water pump and traversing the grinding wheel to and from the work.

The control of the machine is at one point, where the operator has means for traversing the grinding wheel carriage by hand or power, reversing it by hand or power, moving the grinding wheel to and from the work by hand or power, starting and stopping the grinding wheel motor, and also the motor for revolving the rolls.

The machine is intended for grinding chilled iron rolls used for rolling steel plate, intended for making large pipe. The roll is mounted on its own journals while being ground, and this applies both to the grinding of the face of the roll as well as the grinding of the journal itself; in other words, the journals are ground without the centers, this being necessary with the large rolls in most industries, because the centers are either insufficient, or, as is the case sometimes, the roll has no centers. The pillow blocks for supporting the rolls are adjustable for varying sizes of journals.

The headstock spindle is 12 in. in diameter by about 60 in. long. The weight of this spindle is 1900 lb.; the diameter of the 60-deg. centers is 6 in. By removing the roll journal, pillow blocks, universal joint, etc., the machine can be used for grinding work on centers. A crane is fitted to the machine for lifting the grinding wheel with its collar from the spindle and to the floor. The weight of the grinding wheel, cross slide, wheel spindle collar, pulleys, etc., including the wheel guard, is 5800 lb. The workman is protected from possible breakage of the grinding wheel by a solid cast-steel guard or cover which weighs 680 lb. and is approximately 2 in. thick. The water pump delivers approximately 30 gal. of lubricant per min. on the grinding wheel and work. The machine made necessary over 700 detail drawings.

Sweden's Iron and Steel Output in 1912

The production of iron and steel in Sweden in 1912 is as follows, according to a preliminary statement, figures being given in metric tons:

	1912	Increase over 1911
Pig iron	701,900	68,100
Converter steel	107,200	13,400
Open-hearth steel	401,100	38,400
Total steel	508,300	51,800
Wrought iron	148,100	1,400

Wrought iron is gradually being superseded by open-hearth steel in Sweden. Exports in 1912 totaled 204,800 tons of pig iron, 83,500 tons of blooms, billets and other semi-finished products, and 190,300 tons of finished iron and steel. The total of 480,400 tons represents an increase of 62,100 tons over 1911.

New Steam Turbine Connections

Apparatus Arrangement in Power Plants
and Exhaust Heating and Drying Systems

BY GEORGE H. GIBSON

The perfection of the small steam turbine is so recent that certain of its possibilities have not as yet been fully exploited. The purpose of this article is to describe several arrangements of apparatus in steam power plants and in connection with exhaust steam heating and drying systems which offer superior efficiency and economy. In the past, electric motors have been used for the driving of auxiliary apparatus but the turbine-driven auxiliary is

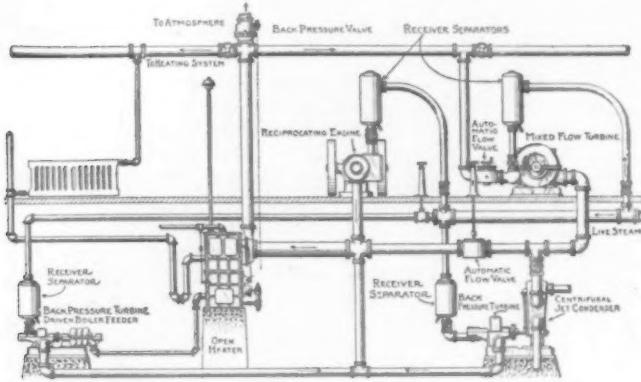


Fig. 1—A Mixed Flow Turbine for Increasing the Capacity and Improving the Economy of a Reciprocating Engine Operated in Connection with an Exhaust Steam Heating System

equal to the motor-driven unit in convenience and flexibility and is not affected by the opening of circuit-breakers or other disturbances in the electrical network. It can also be operated regardless of whether or not the main units are running and may be used to increase the plant efficiency as compared with the reciprocating or electrically-driven auxiliary. When the auxiliary turbines are operated on high-pressure steam their exhaust can be used for heating the feed water, and when low-pressure steam is used the turbine is more efficient in utilizing this steam than the low-pressure cylinder of a compound or triple-expansion engine.

In many steam engine plants more exhaust steam is supplied than is required, and the excess may not be sufficient in quantity to justify the use of a condenser or the type of engine may not permit it. In other cases, where the requirements for steam fluctuate widely, lasting only slightly more than half the year and reaching a maximum for only a month or two, large quantities of steam will be wasted. In such plants a low-pressure turbine can be installed, as shown in Fig. 1, to be operated on the surplus exhaust steam not required for heating and exhausting into a condenser, the cooling water being obtained from a stream or a cooling pond or by the installation of a cooling tower. If the demand for steam for heating purposes at any time exceeds that supplied by the engine, the same turbine may be operated non-condensing and thus assist the engine in carrying the heating load. In this way maximum efficiency is obtained at all seasons, and nearly twice as much power is developed from a given amount of fuel while performing the same heating service.

The piping arrangement shown permits either the engine or the mixed-flow turbine to exhaust directly into the heating system through the open feed-water heater, which is equipped with an oil separator possessing sufficient capacity to handle all the exhaust steam. During the period of heavy heating load the turbine is supplied with high-pressure steam and exhausts into the heating system. In the summer months, however, the turbine runs on the engine exhaust and exhausts in turn into the jet condenser. If the amount of steam supplied by the engine is insufficient at any time to keep the turbine in operation, live steam can be drawn directly through the high-pressure nozzle.

Wherever a low-pressure or a mixed-flow turbine is used, it is advisable to install an automatic flow valve between the low-pressure inlet to the turbine and the engine exhaust piping. A valve of this sort is arranged so that

whenever the pressure in the engine exhaust piping falls to a certain predetermined limit, as $\frac{1}{2}$ or 1 lb. above atmospheric pressure, the valve closes and remains so until the pressure again rises above this point.

In designing a new plant to take advantage of the two-stage method of operation just described, it would be better, rather than introduce the reciprocating engine with the consequent oil in the exhaust, to employ two turbines, as illustrated in Fig. 2, arranged so that both may supply exhaust steam for the heating system during periods when the heating load is heavy, while at other times one may run as a high-pressure and the other as a low-pressure unit, giving an efficiency equal to that of a complete high-pressure turbine, or twice the capacity of the individual turbines. At the same time, the auxiliaries, that is, the condenser and boiler-feed pump, etc., may be driven by turbines and used for balancing the load at times when there would otherwise be either a deficiency or a surplus of steam at the intermediate pressures. For example, when the heating system and the low-pressure turbine can use more steam than is supplied by the high-pressure turbine, the auxiliaries will run on steam at boiler pressure and exhaust into the intermediate piping system, while when the supply from the high-pressure turbines is more than is required by the heating system, the auxiliary turbine will run on intermediate pressure steam, exhausting to the condenser. This arrangement is made possible by the fact that the expansion ratio between boiler and atmospheric pressures is practically the same as the expansion ratio between atmospheric pressure and a 28-in. vacuum, making it possible to employ the same set of nozzles in either range. If still further subdivision or balancing is required, one or more of the main turbines may be of the mixed-flow type.

Referring further to Fig. 2, it will be seen that there are really three sets of piping, a high-pressure system carrying live steam at all of the prime movers, an intermediate system interconnecting the exhaust outlets of all of the turbines with the intermediate-pressure steam inlet openings of the turbine, and a low-pressure system connecting the exhaust outlets to the condenser, together with cross-connections for operating any one of the machines through either half of the range, that is, with live steam exhausting to intermediate piping or intermediate steam exhausting into the condenser. To prevent any possi-

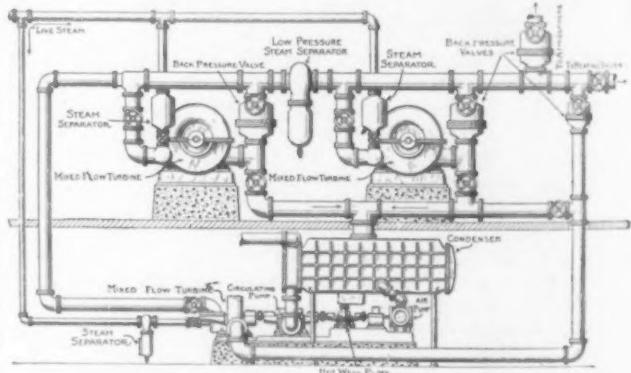


Fig. 2—Two Mixed Flow Turbines Arranged to Form a Combined Economical Exhaust Steam Heating and Condensing System

bility of boiler pressure building up in the intermediate piping, the latter is vented to the atmosphere through a back-pressure valve. A similar valve is connected between the exhaust outlet of each of the main turbines and the intermediate piping, so that in case high-pressure steam should be turned into the turbines while the valve in the exhaust line to the condenser is closed, pressure could not accumulate in the turbine casing higher than the intermediate pressure. At the same time, when the valve to the condenser is open, this automatic valve prevents intermediate steam from flowing directly to the condenser.

The Cleveland Punch & Sheer Works Company, Cleveland, Ohio, has taken an order from the Cambria Steel Company for a large 10-ft. multiple stake punch. It is stated that this machine will be mechanically the most complete punch ever built for the fabrication of railroad steel car material.

Tin Plate Doubling and Shearing Machine

An Automatic Machine for the Doubling Operation in the Sheet Mill

Manufacturing rights have been recently granted to the Lewis Foundry & Machine Company, Pittsburgh, Pa., to manufacture an automatic tin plate doubling and shearing machine. This machine is intended to double the various sheets as they come from the rolls and shear them before they go to the heater. Fig. 1 is a view of the machine before it is installed, while Fig. 2 illustrates it at the commencement of the doubling operation.

The machine consists of a shaft driven by a sprocket wheel that is fastened to and detached from the shaft by a clutch mechanism. Attached to this shaft are two cranks which are connected to the folding table by rods. The table is carried upon toggle legs and is attached to cross-heads, one on either end of the doubler, which in turn are carried by guides. A knife which is automatically thrown down at the proper time locking in position and receding with the tilting of the doubler, is fixed in one of the cross-heads. This arrangement clamps the pack to be doubled securely on the table, but at the point where the pack has become fastened in the doubling leaves, the knife is automatically thrown out and left in an upright position for the next operation. The full cycle of the crank is made and the pack is left lying upon the floor doubled. The matching arrangement, which consists of six fingers protruding through the floor and arranged on a hinge joint, so that a pack can be pulled over them without interference, is one of the special features of the machine. The fingers at the side are in unison as well as those at the end and all are operated from one lever. If the pack is scattered when it is placed on the doubler, one pull of the lever will match the sheets edgewise and endwise and bring them into the proper position for doubling, no adjustment being necessary as the fingers come to their common position and are only stopped by the pack itself.

The machine, which has a capacity of 30 strokes per min., is installed between the furnaces in the mill. In operation, the rougher throws his pack from the rolls into the doubling machine which is level with the floor. The pack is opened by the screw boy and the operator by one pull of the matching lever matches and centers the pack on the doubling machine. By applying foot pressure to a pedal the pack is doubled, the commencement of this operation being shown in Fig. 2.

From the doubling machine the sheets go to the shear, which is not shown and stands at right angles to the doubling machine. The operator takes the pack in his tongs by catching it at the curl end, slips it across the floor, and pushes the crop end under the knife until the pack is stopped by an adjustable guide pin. The pack is made straight by a side guide and another touch of the lever completes the shearing operation. After this is done



Fig. 1—A New Automatic Tin Plate Doubling and Shearing Machine

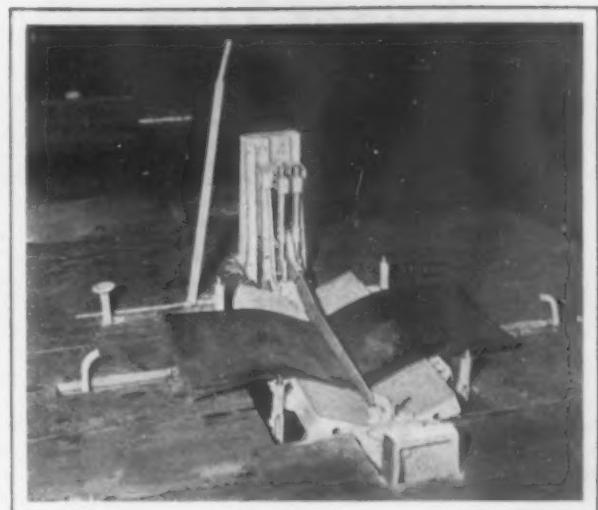


Fig. 2—The Machine at the Commencement of the Doubling Operation

the pack is thrown over to the heater, thus eliminating the necessity of any labor to double or lift the pack from the floor at any time.

A German Crane Builder's Catalogues

An interesting album of views of the three works of the Deutsche Maschinenfabrik A-G, Duisburg, Germany, giving an insight into the equipment and method of operations of that large industrial establishment, has been printed with English explanatory text. It is being circulated by Neumeyer & Dimond, 82 Beaver street, New York City, who have the rights to the patents and business of the company in this country. The publication is an unusual one of 92 large-sized pages, generously illustrated, and incidentally is very convincing regarding what can be done in the way of large and unusual land and floating cranes and transporting appliances. The views also prove what a large part Demag, Ltd., as the company is sometimes styled, has taken in the equipment of blast furnaces, steel works, rolling mills and mining properties. Cranes for workshops, lifting magnets, steam hammers and forging presses come in for some attention.

The same company has also just issued an elaborate catalogue which shows 25 years of development in building large cranes. Detailed drawings of its first crane, in 1887, and succeeding ones are given. The real incentive for the catalogue is the completion in 1913 of the largest crane in the world, a crane that can clear the biggest steamer afloat and lift 250 tons through 1.6 meters (5.25 ft.) per min. It is so constructed that by means of a jib, moving through an angle of about 80 deg., larger ships that may be built can be served with the same ease. The crane referred to has just been built for Blohm & Voss, Hamburg.

Employer and Employees Work Together

The Clipper Belt Lacer Company, Grand Rapids, Mich., furnishes information which indicates a spirit of cooperation undoubtedly brought about by the cultivation of better relations with employees. President Charles P. Foote was prominent in a nine days' campaign in that city for the raising of \$250,000 for a new Y. M. C. A. building. Going over the lists of donors, it was discovered that not only had the company made a subscription to the project but every officer in the company subscribed individually and every one of the 48 employees made a subscription. It is believed that this combined interest has been brought about by the company's piece-price system and its profit-sharing plan described in *The Iron Age* of January 30. The new plan, it is stated, has increased the company's output quite largely, increased the earnings of the employees better than 20 per cent., and reduced quite materially the cost of production.

The Russian import duty on foreign pig iron has been reduced 50 per cent. by the Russian Government on representations that a scarcity existed in the domestic market.

The Talbot Method for Compression of Ingots

Results of Further Experiments Detailed by the Inventor—Sound Finished Steel and Economy in Production

At the annual meeting of the Iron and Steel Institute, held in London, May 1 and 2, the Talbot sound ingot process occupied a prominent place, as was indicated by the discussion reported in our last issue. A paper was presented by Mr. Talbot in which he discusses his method in detail and gives his results and conclusions to date. Much that appears in this paper has already been given in substance in these columns. In *The Iron Age* of October 17 and November 14, 1912, and of February 27, 1913, the salient features of the process and some important comment upon it were published. Extracts from the latest paper covering new developments that are of importance are given below:

In the method of the compression of ingots with liquid centers, which the author is now investigating, the casting and cooling of the ingots are regarded as skilled metallurgical operations. It is necessary to create and to observe a timetable between the time at which the ingot is poured, stripped and charged into the soaking pit, and its area reduced by the preliminary operation. By reducing the cross-sectional area at this time by means of lateral pressure, compensation is given for the contraction which is taking place within the mass, due to the solidifying and cooling that is going on in the center of the ingot. When this has been accomplished, the reduced ingot is preferably returned to the pit or otherwise kept sufficiently hot for finishing.

After this preliminary work the element of time is no longer necessary as regards effecting the solidity and chemical formation in the mass, as the compression of the ingot fixes this, and even when kept heated for an indefinite period, no change is observed in the composition of the finished product, except such diffusion as may be expected from the elongation of the ingot in rolling into sections of various shapes. The ingot is preferably treated with a deoxidizer, such as aluminum, in order to create a piping steel, with no blowholes in the outer area. This gives a solid outer envelope, which is very important when compressing the ingot, as blowholes tend to weaken the shell, neither are they always eliminated when rolled down. The use of a deoxidizer also solidifies the metal earlier, so that the ingot can be stripped in less time than if none be used.

The Segregate in Compressed Ingots

[Mr. Talbot then discusses fully the effect of aluminum as a deoxidizer, showing the necessity of its use in his process and also the peculiar segregation resulting; i. e., the three zones of different metal in the compressed ingot—the center (purer than the outer zone), the inner wall (where the segregate is thrown), and the outer envelope. He states that compressed ingots have been cut through their centers longitudinally, and segregation is not found in the usual place, namely, in the central area of the upper portion; but wherever pressure has been applied before

solidification of the central portion has taken place, segregation has been formed upon and in the inner wall of the solid envelope, in the shape of a deposit higher in carbon and sulphur, of somewhat regular composition. "This has caused surprise among some of our well-known metallurgists. Dr. Stead has explained it by a very beautiful theory, which the author believes Dr. Howe accepts. Anyway, whatever theory may be the correct one, we have to accept it as a fact that if ingots are reduced in area while some portion of their centers are liquid this formation occurs, and the conical pipe or cavity does not exist as it otherwise would."

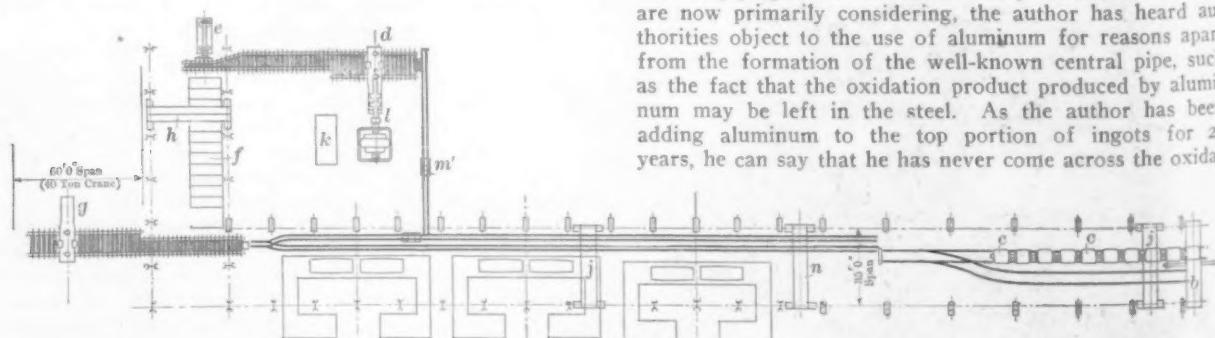
The most important point to settle is to determine what this (compression) treatment, with its characteristic formation, really means to the physical properties of the steel in the finished product, as compared with what we obtain with present day practice from the upper portion of the ingot.

We have also to consider the extent of this segregation and ascertain if it is sufficient in amount to be detrimental. Segregation in ordinary steel practically confines itself to the non-metallic elements—sulphur, carbon and phosphorus. Fortunately the percentages of increase in the metallic elements, such as manganese, and in silicon do not fluctuate to any appreciable extent in a normal good heat of steel. With rails made largely by the basic open-hearth process the segregation of phosphorus can be neglected, as this element will only average about 0.03 per cent., and an increase up to 0.04 per cent. in the restricted segregated area is of no moment.

The Effect of Aluminum

The diffused segregated area is very small when compared with the area of the outer solid envelope and the purer central portion. It is found that the thick outer envelope of ingots to which the deoxidizer has been added consists of steel of the normal analysis of the heat, and that the carbon in the darker ring averages some 15 to 20 per cent. higher, and the sulphur some 35 to 40 per cent. higher than in the normal metal. In any case, the place in which the excess is found is not so harmful as it is under the usual condition. In ordinary practice, where deoxidizers are not added, segregation is erratic, the segregate being found in and around the walls of the cavity, so that we have the double disadvantage of trying to weld up spaces surrounded by very unsuitable metal in the center of the ingot.

In the cooling and solidifying of ingots we have to contend with the forces of nature. We have liquid iron, containing a few other elements, at a very high temperature, consequently in a great state of expansion, and in the best condition therefore for absorbing gases. For some trades operators dead melt their steel, but they invariably use some powerful deoxidizer, such as silicon, and produce a solid piping steel. In the ordinary trades, such as we are now primarily considering, the author has heard authorities object to the use of aluminum for reasons apart from the formation of the well-known central pipe, such as the fact that the oxidation product produced by aluminum may be left in the steel. As the author has been adding aluminum to the top portion of ingots for 20 years, he can say that he has never come across the oxidation



General Arrangement Showing 40-inch Blooming Mill and Necessary Appliances Coupled with Squeezing Plant for the Talbot Method of Lateral Compression of Ingots with Liquid Centers. When Work Is Being Done in the Ordinary Manner Soaking-pits are Used Direct. When Squeezing Is Being Done, Soaking-pits are Used as Preliminary Heaters Prior to Squeezing, and the Product of the Squeezing Mill is Passed Through the Continuous Furnace Before Blooming Down. a, Soaking Pits; b, Ingot Stripper; c, Ingot Bogies; d, Squeezing Mill; e, Hydraulic Pusher; f, Continuous Furnace; g, Blooming Mill; h, Special Crane for Ingots; jj, Ingot Cranes; k, Ilgner Set; l, Flexible Coupling; m, Ingot Chariots Side Tip; n, Crane

tion product from 2 oz. of aluminum per ton enclosed in the steel, and he doubts if it could be found, even if there, when added in such small quantity. He does not agree with this objection, because, so far as producing a good surface on sections with flanges is concerned, there is no comparison between the steel from the top portion of the ingot to which aluminum has been added and steel to which no special deoxidizer has been added. It is unfortunate that the pipe formation is so large, as the mechanical tests are better and the segregation is decreased.

Variations in Gas in Cavities

It may be of interest to note here the variation which occurs in the composition of the gas which fills these cavities when the ingot is dumped after stripping without reheating, when it is treated with or without aluminum, and when it is reheated. The following three analyses of gas from three ingots were made, the first two being from ingots to which no aluminum had been added, and the last from an ingot to which 2 oz. of aluminum per ton had been added:

	1 Per cent.	2 Per cent.	3 Per cent.
Carbonic oxide	5.00	0.0	0.0
Nitrogen	3.67	4.40	19.34
Hydrogen	91.33	95.60	80.66
Total	100.00	100.00	100.00

In the first of these analyses the ingot was not reheated in the pit and had no aluminum added, while in No. 2 (from an ingot with no aluminum) and No. 3 (with aluminum) the ingots were reheated in the pit; and the author suggests, without formulating any theory, that this fact may account for the absence of any carbonic oxide in the gas from these two ingots, while there is 5 per cent. of carbonic oxide in the first, which was unheated. It is also worth noting in regard to these analyses of gases that in the case of the ingots to which no aluminum had been added, the percentage of nitrogen is comparatively low, while in the gas which formed in the cavity in the ingot to which aluminum had been added it reaches nearly 20 per cent., or about five times higher than in the other two. May not the aluminum addition have had some action in setting free this nitrogen from its combination with iron?

To improve the quality of the finished article, such as a rail, it would appear that in solid piping steel we have the condition which will yield the result if we can only remove the pipe or prevent it from forming. It is therefore to this problem that metallurgists and others skilled in the art should direct their attention. If we do not have solid piping steel, we have no solid outer envelope, but steel with blowholes in some portion of this area, and blowholes and cavities in the center of the upper portion of the ingot, with segregate collected around these central cavities to an increased amount. The rail produced from such steel will not be so good as the rail produced from the solid steel, since the outside wearing surface will be softer and will contain some rolled-out blowholes, and will moreover have a hard and impure core due to the segregate, which may not be thoroughly welded together, consequently the best results in actual wear cannot be expected.

While failures in the heads of rails are more numerous in the United States than from other causes, yet trouble is also experienced in that country with base failures. These, according to Mr. Cushing, are due to longitudinal seams in the base, and it appears probable that some of these seams result from the blowholes in the outer strata. This difficulty from blowholes will be overcome if we use steel with a solid outer envelope.

Effect of Lateral Compression on the Finished Rail

In order to settle the question of the effect upon the finished rail of the lateral compression of the ingot while its center is still liquid, very careful and extended tests have been made on many rails. As the drop test is the most reliable and effective practical test, this has been chiefly used. [At this point Mr. Talbot gives an extended table containing detailed particulars of the rails rolled from ten 4½-ton ingots compressed with liquid centers taken from ten different rail heats of various analyses, sections and specifications.] A drop test of each rail was obtained from the top to the bottom of each ingot, in order to see if any practical differences could be observed in the de-

flections obtained, and also to ascertain if the rails would stand the standard drop test without breaking when taken from all positions in the ingot. These ten ingots produced 67 rails, and no breakages under the drop occurred. The deflections are very satisfactory. If there had been any inherent physical weakness due to the compression of the ingot while the center was liquid, there would have been a number of breakages, as it is a severe test to subject every rail made to the drop test.

The average analysis of the 10 heats is given in Table 1.

Table 1—Average of Ten Heats

	Carbon, per cent.	Sulphur, per cent.	Phos- phorus, per cent.	Manganese, per cent.
Outer envelope	0.61	0.055	0.024	0.69
Darker ring.....	0.68	0.073	0.029	0.71
Central portion.....	0.50	0.042	0.018	0.68
Increase in darker ring over outer envelope.....	11.0	32.0	20.0	...

From the results obtained from the rails rolled from these ten ingots, it was found that the yield of good merchantable rails of first quality was slightly over 88 per cent. on the ingot, and as these contain no pipe or segregation in the center, but only a segregation to a known harmless amount in a well-defined position, such rails are more satisfactory both as regards yield and quality than those made by ordinary every-day practice. Again, so far as the author's experience goes, no such product as a defective or second quality rail will be produced due to any surface defects, such as torn flanges and seams, as these do not exist in rails made from steel treated in this manner, so that there is thus a distinct saving in manufacture.

The average weight of bloom scrap from the cogging mill over the ten ingots was 4.68 per cent. on the ingot, and this is satisfactory. The rail crop averaged 4.06 per cent. on the bloom, and as this rail crop scrap in the particular rail mill used will be practically the same from all kinds of sound blooms, the 88 per cent. of good merchantable rails and the 4.68 per cent. of bloom crops are the two important points to consider.

A summary of the results is given as follows:

	tons cwt. qr. lb.
Total weight of 10 ingots was	42 6 0 20
Good merchantable rails.....	37 7 1 10 = 88.3 per cent. on ingot
Cogging-mill scrap weighed.....	1 19 2 13 = 4.68 per cent. on ingot
The rail crop weighed.....	1 12 2 24 = 4.06 per cent. on bloom

The question has been asked, assuming the method to be used, how can compression be applied commercially to ingots partially liquid in existing steel works. We must always remember that we are dealing with physical forces, and therefore if we desire to obtain a certain definite result, we must obey natural laws, and in this case punctuality in time is the important factor. Where fixed open-hearth furnaces are used it would certainly need some reorganization and control in the casting and stripping department. In fact, as stated before, the happy-go-lucky days in this department will be over, and a strict time table would have to be observed under skilled supervision, in order to supply the preparatory compressing plant in a satisfactory manner.

The practice of a considerable number of furnaces tapping as they like, at the same time, as is common today in shops containing a large number of fixed furnaces, would be stopped. A better sequence in the tapping of the furnaces would be required, and in this and in other respects the 200-ton tilting furnace is a more suitable apparatus to use than its smaller fixed competitor. There would not be this trouble where Bessemer steel is used, as the heats follow each other in steady progression.

To get good results ingots of, say, 20 x 24 in. or 25 x 25 in., ranging from 3½ to 4¼ tons, are suitable, although, if the method comes into use, larger ingots will be employed in some cases. In fact, in this method of treating ingots, the increase in weight will be an advantage, as a greater range in the critical time period occurs; that is, the minimum and maximum time between which one can obtain the formation and produce a sound mass. As heavy machinery would be installed, there would be a distinct saving in handling larger ingots. The small ingots, with the old-fashioned expensive sunk pit, will not be used, and casting on cars could be adopted with advantage with the use of the overhead stripper system.

If we consider a moderate output, such as could be obtained from a mill in this country, we can assume that a cogging-mill will cog down 25 x 25-in. ingots to 8 x 8 in. blooms, and that it works 107 actual working hours dur-

ing the week, and further that it deals with 1200 tons of ingots per 24 hours, or 60 tons per working hour, which would give 6420 tons of ingots in the working week. The casting and preparatory compression processes would have to keep ahead of this. If it were possible to tap the furnaces regularly it would only mean one 60-ton heat per hour, but the preparatory plant could be arranged to take two heats, which may be tapped and poured at the same moment, therefore its capacity must be equal to 120 tons in any one hour, even if it did no work for the next hour. In 120 tons there would be 28 ingots of 25 x 25-in. size. It takes about 20 minutes to pour a 60-ton heat when using 1½-in. nozzle, and larger nozzles should not be used. To be safe, a 25 x 25-in. ingot, when aluminum is used, should not be stripped under 25 minutes from the time it is poured, as otherwise it may bleed if lifted off the bottom plate.

The heat is run under the traveling stripper under the time of 25 to 30 minutes, and the stripper will strip the ingots in the order in which they were cast in a steady progression. The stripper will easily strip the ingots in less time than it took to cast. Occasionally two heats may have to be dealt with at the same time; in this case the spare stripper will help at the work, so that uniform time may be kept. Ample soaking pit capacity will be provided to find room for the ingots as soon as they are stripped.

If a reversing set of rolls be used in the preparatory plant to compress the 25 x 25-in. ingot down to about 19 x 19 in., there will be sufficient time to do this work, seeing that the cogging mill has to roll down the 19 x 19 in. to 8 x 8 in. For larger outputs a continuous set of rolls could be installed for the preparatory process.

Although the exact minimum time in which an ingot can be drawn out of the soaking pot, after its envelope has been heated up and thickened, will vary with the size, yet it must be left there for a sufficient length of time to permit the shell, especially on the top and bottom, to thicken and to become sufficiently strong to resist the pressure of the rolls without rupture. The range in time between the minimum at which the ingot can be drawn, and the maximum before the center becomes solid, also varies with the size of the ingot.

In the table referred to is given the time used on the ten ingots of 25 x 25 in. size, showing that an average of 29 minutes intervened between the time of pouring and stripping the mold from the ingot, and an average of 58 minutes from the time of stripping the ingot and drawing it from the pit for the preparatory compression.

The illustration herewith shows the ground plan and elevation of a suggested lay-out for carrying out the process.

Mr. Talbot's Conclusions

From the foregoing it will be seen that in dealing with ingots of 3½ to 4 tons weight (which is a size which is probably more used than any other for rails) lateral compression of the ingot is effected at the time when the last portion of the center is liquid. If solidification of the ingot is to be brought about by any method of feeding from a sink head, then the sink head must be kept liquid until shrinkage is complete. To fill up the shrinkage cavity by any method of feeding, the ingot must remain in the mold until it is solid throughout, the top being kept liquid during the whole time.

This investigation shows that it is quite feasible to obtain a perfectly sound product in finished sections, and that even when deoxidizers are used piping can be obviated in such product with only a very small discard in the way of bloom crops, by the simple economical preparatory treatment described, which results in a considerably lessened percentage of scrap as such or as defective material than with to-day's practice, and an appreciable increase in the yield of merchantable product, with consequent economy in production.

It also appears that the typical formation developed by laterally compressing an ingot while its center is liquid gives more regular and better physical results on all kinds of mechanical tests taken from the upper portion of the ingot than those obtained in to-day's practice from the same position in the ingot.

The foregoing results and conclusions are based upon the investigation of more than 100 large ingots, and the author has no hesitation in saying that anyone following the method he has outlined with ordinary care will be able

to obtain similar results on ingots of approximately the same size.

Oxy-Acetylene in Bridge Wreckage Removal

A demonstration of the time and labor-saving possibilities of the oxy-acetylene torch was recently given at Indianapolis, Ind., when the Prest-O-Lite Company, of that city, contracted to cut away the steel wreckage from two of the largest bridges in the city. These structures, which spanned White River at Washington street and Fall Creek at North Meridian street, respectively, were wrecked during the recent flood. The bridges both had heavy steel girder framework covered with stone and concrete and when the bridges were carried away, the supports were reduced to a heap of twisted junk.

When the city engineer saw that the heavy steel work could not be cleared away by any means at his disposal,



Clearing Away the Steel Work of One of the Indianapolis Bridges Wrecked by the Recent Floods with an Oxy-Acetylene Torch

he called upon the Prest-O-Lite Company and welding outfits were taken to the two bridges and put in operation with cutting torch attachments. The steel girders were rapidly cut and placed in position for easy removal. The entire work of cutting away the twisted mass of wreckage requiring only a little over three days. The welding outfit with its cutting torch first heated the heavy girders and then directed a stream of oxygen against the hot metal. This caused the steel to burn quickly, the average time consumed in cutting a girder being a little over 5 min. Another advantage of these outfits was their portability, as the compact outfit mounted on a light, two-wheeled truck was easily moved from place to place over the ruined bridges.

China's Pig-Iron and Steel Output.—The Hanyang Iron & Steel Works, Hanyang, China, according to the Central China Post, is operating two of its four blast furnaces, with a daily production of 240 tons. The repairs to the third furnace will soon be completed, after which the daily production will amount to nearly 500 tons. Three of the six open-hearth furnaces are in operating condition. About 100 tons of steel is made daily, while 200 tons of rails can also be produced in the same time. At a meeting on March 28 of the stockholders of the Han-yeh-ping Corporation of China, which controls the Hanyang Iron & Steel Works, in addition to other properties, a proposition to share the management with the government, making the company partly state controlled, was rejected.

A Large Boring and Turning Mill

A 31-Ft. Reach Arm and Provision for an Auxiliary Tool Column

One of the largest boring and turning mills ever constructed has been recently completed by the Niles Tool Works, Hamilton, Ohio, and is installed in the Philadelphia plant of the William Cramp Ship & Engine Building Company. Aside from the massive size of the machine, there are a number of distinctive features that are of interest, the chief of these probably being the reach arm, which is 31 ft. long. This long arm is provided for reaching the center of the table when the housings are set back, and as a boring head traverses the entire length of the arm, any piece of work from 10 in. to 29 ft. can be handled. Another interesting feature about the machine is the provision made for an auxiliary rear tool column, with feed mechanism for taking care of work when the pieces to be machined are higher than can be ordinarily handled.

The reach arm has a 36-in. face and is arranged to carry a boring head having a bar feed of 60 in. One end of the arm is attached to the main cross rail of the machine and the other is supported on a column placed on a sole plate in front of the machine. This column is necessary as the reach arm has a total weight of almost 35,000 lb. A small adjustable-speed motor is mounted on the reach arm, so that the saddles and bars have power feed, and power and hand adjustment, the same as the main cross rail heads, of which there are two. These heads have a down feed of 8 $\frac{1}{4}$ in. Each of the two boring heads on the main cross rail has an operator's platform. In addition to the power feeds for the bars and saddles, rapid power adjustment is provided for both, this adjustment being controlled from the platform. There is also a final hand adjustment that is also controlled by the operator. The main cross rail has a 42-in. face and is reinforced on top with a deep arch and is clamped to the housings both inside and outside of the posts.

The table is 18 $\frac{1}{2}$ ft. in diameter and 20 in. deep. It is arranged to travel on two tracks, which is an unusual arrangement. The table gear is 188 in. in diameter and 10 in. wide across the face. This gear is driven by a 50-hp., 220-volt, direct-current, adjustable-speed General Electric motor. The total weight of the table is 85,000 lb., and as it was not possible to ship a casting of this size in one piece, it was necessary to use a split core in the mold. This arrangement enabled the foundry to make the casting

in one mold, but in two sections, and also insured a uniform shrinkage in both halves of the table. The casting was allowed to remain in the pit six days to cool. As is customary, the T-slots in the face of the table were cored in. After the two sections of the table were planed, they were fastened together by tongue and groove joints. The minimum estimated load that this table will carry is 300,000 lb.

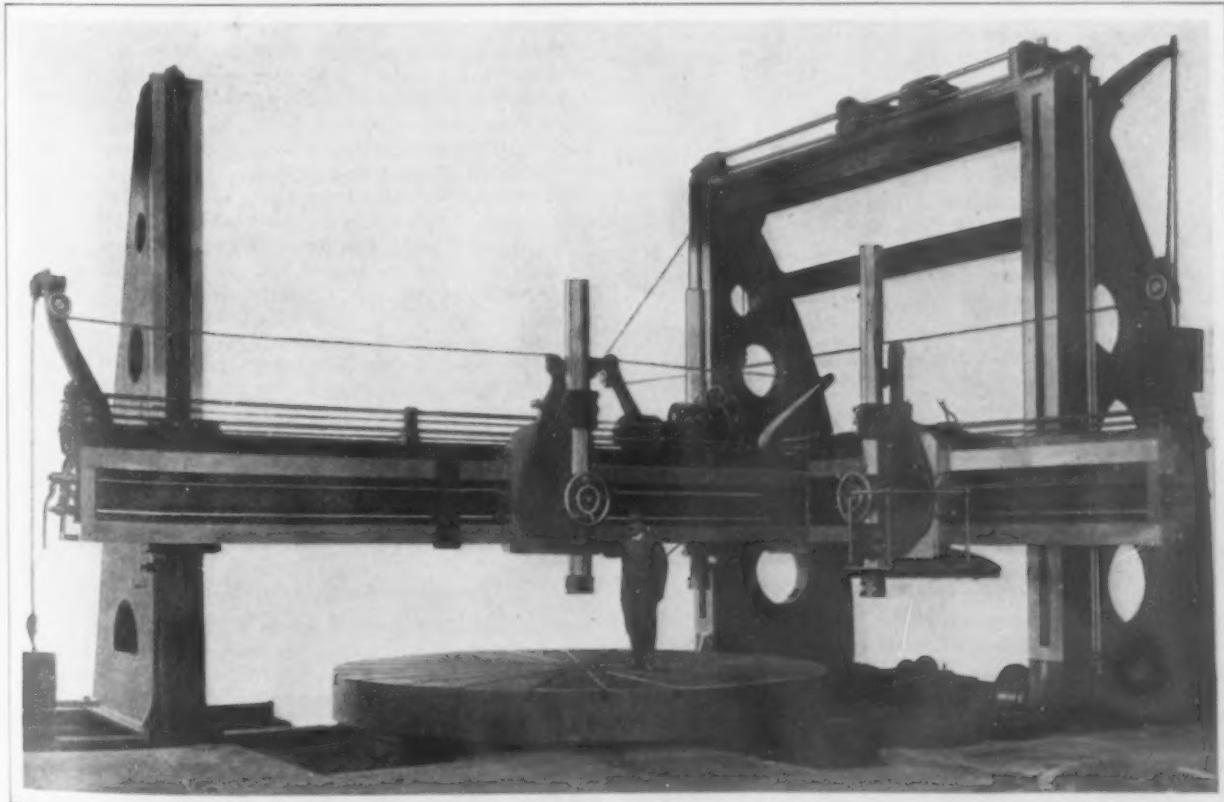
Massive design characterizes the housings, the front post of which is 20 in. wide. They have a bearing on the bed 26 in. wide and 112 in. long, and are connected at the top by a heavy cross girder. Additional bracing is provided by a heavy girt placed back of the cross rail and somewhat lower down. A 10-hp. General Electric motor located on the rear cross girt of the bed provides for the adjustment of the housings on the bed.

The total weight of the machine, including the various motors, is approximately 500,000 lb. If the auxiliary rear column should be added it is stated that the machine would, without doubt, be the largest tool of its kind in point of weight over constructed.

The American Steel Split Pulley

The American Pulley Company, Philadelphia, has had remarkable success in building up a business in a completely new product. About 1895 Thomas Corscaden exhibited a model of what is now known as the American steel split pulley. It was slow to obtain recognition and it was several years until a company was formed for its manufacture. Practical mechanics and trained engineers then became convinced that it possessed the essentials of pulley efficiency. The smooth surface of the face, provided with grooved air escape, produced a superior belt grip, while the lightness of the pulleys saved power and their tight grip on the shaft obviated the cutting of key ways or the use of set screws. Splitting the pulley also made it so easy of application that this became a strong feature in its introduction. The company states that at present more than 2,000,000 American steel split pulleys are in use and it claims that it now operates the largest pulley plant in the world.

One of the two blast furnaces of the Pennsylvania Steel Company at Lebanon, Pa., was blown out last week after a campaign of about 18 months.



A Very Large Boring and Turning Mill with Provision for an Auxiliary Tool Column for Machining High Pieces

Spring Meeting of Machine Tool Builders

Extension of Committee Work and Time for Business Only Were Innovations— Tariff Issue an Overshadowing Topic

The semiannual convention of the National Machine Tool Builders' Association was held May 15 and 16 at the Hotel Astor, New York. The attendance was smaller than expected, one reason being that a number of Cincinnati members were kept at home by the street railroad strike in that city which had created a problem in getting employees to their work. In 1911 and 1912 the semiannual meetings of the association were held in Atlantic City, N. J., but at the eleventh annual convention held in New York in 1912 it was decided that the next semiannual or spring meeting would be held in New York and also that it would be distinctly a business meeting. This plan was carried out. On the morning of May 15 a general session was held, while the afternoon was devoted solely to committee meetings, each of which was designed by the type of machine tool in which the committeemen were interested. The morning of May 16 was devoted to similar committee work and in the afternoon another general session was held.

Uneasiness Over Proposed Lower Tariff Rates

The question of the effect upon the machine tool industry of the proposed Underwood tariff was a topic uppermost in the minds of the members, both in and out of the meetings, though all opinions were quietly expressed. Personal expressions were that retrenchment and increased efficiency would be necessary under the proposed cut in duty on machine tools. There was evident a feeling among the members that all possible had been done to conserve the industry and to a large extent resignation had taken the place of any inclination to protest further.

More Members to Participate in Committee Work

Because of the feeling that great good derived through the association has been from committee work and because of the numerous requests from members who were not identified with any committee, it was considered desirable to adopt the following arrangement of committees, several of the existing committees having been subdivided:

- | | |
|---------------------------------|-----------------------------------|
| A. Bolt Threading Machine. | F. Hammer. |
| B. Boring Machine. | G. Lathe. |
| (a) Horizontal. | (a) Plain. |
| (b) Vertical. | (b) Turret. |
| C. Drilling Machine. | H. Metal Sawing Machine. |
| (a) Electrical Portable. | I. Milling Machine. |
| (b) Heavy Duty Box Column Type. | J. Miscellaneous. |
| (c) Radial. | K. Planing Machine. |
| (d) Sensitive. | L. Press. |
| (e) Vertical. | M. Punching and Shearing Machine. |
| D. Gear Cutting Machine. | N. Screw Machine. |
| E. Grinding Machine. | (a) Automatic. |
| (a) Cylindrical. | (b) Hand. |
| (b) Cutter and Tool. | O. Shaping Machine. |
| (c) Disc. | P. Slotting Machine. |
| (d) Drill. | |
| (e) Floor and Bench. | |
| (f) Internal. | |
| (g) Surface. | |

The subcommittees worked independently. They met for the first time at this convention and it was planned to effect an organization at least and map out work for the future.

President Bullard's Address

In his opening remarks to the convention, E. P. Bullard, Jr., Bullard Machine Tool Company, president of the association, said that the method of conducting the convention was an innovation and that it was hoped that the experiment would demonstrate if greater benefit could be obtained from a meeting devoted entirely to business. He alluded to the tariff situation by saying that all the members were familiar with what had been going on at Washington and that they also well realized the need of increased efficiency if changing conditions were to be met successfully.

He had been greatly impressed by the opportunities which existed in committee work and hoped that this phase of the convention would be given serious attention. As an evidence of what might be accomplished, he mentioned the success of the Lathe Committee whose work had resulted in benefits for both sellers and users of such tools.

President Bullard said there are great fields yet to be developed by the machine-tool builders; among them China, Japan, South America, South Africa, Australia and New Zealand. It is well within the province of the association, he said, to attempt the formulation of plans for getting more foreign business for its members. Foreign banking methods and other influences on business should be investigated and data gathered to better enable American manufacturers to reach foreign countries. Incidentally, he said that much is heard of what Germany is doing along these lines. German manufacturers' methods, he said, were plugging methods, namely, they will send salesmen to other countries and keep them there for years without prospect of immediate returns in trade benefit.

Business of the Convention

Following the report of the Membership Committee, Charles E. Hildreth, Whitcomb-Blaidsell Machine Tool Company, chairman, these companies were elected to membership: Cincinnati Electrical Tool Company, Cincinnati, Ohio, and Wickes Brothers, Saginaw, Mich.

Convention committees were announced as follows: Resolutions, J. W. Carrel, Lodge & Shipley Machine Tool Company, chairman; J. G. Benedict, Landis Machine Company, and Winslow Blanchard, Blanchard Machine Company. Auditing, J. B. Doan, American Tool Works Company, chairman; Harding Allen, Charles G. Allen Company, and R. E. Flanders, Jones & Lamson Machine Company.

Called upon for his report, General Manager James H. Herron, Cleveland, Ohio, said he had little to present inasmuch as the members had been kept informed as to progress by letters sent from his office. A. E. Newton, Reed-Prentice Company, treasurer, reported that the financial affairs of the association were in a satisfactory condition. The report was later approved by the Auditing Committee.

Charles L. Taylor, Taylor & Fenn Company, reported for the Patent Committee, of which he is chairman, that a legislative measure known as H. R. 1700 should be opposed for the reason that it is in effect a repetition of the Oldfield bill which was a subject of discussion at the annual meeting last fall. It proposed a radical revision of the patent laws. Action was deferred until the annual meeting.

C. Wood Walter, Cincinnati Milling Machine Company, of the Committee on Legislation, in the absence of Frederick A. Geier, chairman, rendered an informal but detailed account of the efforts made to secure adequate consideration from the tariff law makers at Washington. On motion of Mr. Hildreth a vote of thanks was given the committee, but in speaking to his motion Mr. Hildreth expressed the opinion that the committee should be continued and this was the sense of the meeting. Mr. Walter then moved a vote of thanks to Henry D. Sharpe, Brown & Sharpe Mfg. Company, for his presentation of the machine tool builders' case before the Ways and Means Committee of the House of Representatives. The motion was carried unanimously.

Question of Forming Mechanical Section

R. E. Flanders, Jones & Lamson Machine Company, obtained the floor to explain several points bearing on the proposal to establish a mechanical section of the association. The question was brought forward at the last annual meeting in a paper by E. J. Kearney, Kearney & Trecker Company, and action probably will be taken on it at the next annual meeting.

Mr. Flanders suggested that, pending the meeting, it might be well for the members to consider first of all whether such an adjunct to the association should be

created. It had been proposed, if the section is formed, that delegates to it should include designated draftsmen, foremen or other employees so that the membership would not be indiscriminate. The expenses of such delegates should be borne by the companies employing them. Another question cited by Mr. Flanders for consideration was the time best suited for the meetings of such a section, whether before or after the annual convention. He said he disapproved of a suggestion that the section, if formed, affiliate with the American Society of Mechanical Engineers.

The purpose of the section, as explained by Mr. Flanders, is to promote a free interchange of ideas of shop management, practice and design, though he emphasized that it was not intended to go to extremes. He said that his company has some excellent methods in practice which are not generally used. Other companies likewise have good methods not in use in his plant and he thought an opportunity for an interchange existed. As to trade secrets, Mr. Flanders said that his experience in trade journalism had taught him that there really were very few.

Mr. Flanders was heartily applauded when he concluded. While many approved the ideas he expressed, others, outside of the meeting, expressed the view that such work as a mechanical section would do might better be relegated to the American Society of Mechanical Engineers. The question is now in the hands of a special committee which is to report at the annual meeting.

Resolution for Efficient Patent Commissioner

At the final session, May 16, the Resolutions Committee reported the following:

Whereas, The qualifications of a Commissioner of Patents are of great consequence to manufacturers, inventors and their legal representatives, be it

Resolved, That the next appointee as Commissioner of Patents should be an actively practicing patent lawyer of wide experience in the actual trial of patent cases in the Federal courts and thus really qualified to harmonize the Patent Office practice with the principles of law as applied by the courts, a reform of which there is immediate and imminent need. Be it further

Resolved, That the appointee should be selected solely with reference to individual merit, efficiency and established reputation, free from any personal, political or business associations imimical to the best interests of all inventors and the entire patent bar. Be it further

Resolved, That copies of these resolutions be sent to prominent industrial organizations with requests for indorsement and also that copies be forwarded to Senators and Representatives by their constituents.

The committee also reported and the convention adopted a resolution paying a tribute to the memory of Frederick N. Gardner, president Gardner Machine Company, Beloit, Wis., who died from pneumonia May 11. A letter received by Mr. Herron not only told of the death of Mr. Gardner, but also reported the serious illness with the same disease of his brother, F. E. Gardner, vice-president of the company. A resolution of sympathy and hope for his speedy recovery was sent to the afflicted brother.

The convention closed with an executive session at which there was the usual "heart to heart talk."

Cincinnati Permanent Exhibition

The Manufacturers' Permanent Exhibit Building in Cincinnati is declared to be assured. An announcement has been made by Luke W. Smith, chairman of the Ways and Means Committee, who has been actively at work on the project for some months, that the company will be incorporated at Columbus with a capital stock of \$700,000 and that the project has been financed. The building will be located on the present site of the Burnet House, and plans for the structure have been completed by Garber & Woodward, architects.

The proposed building will be of modern and appropriate construction, including every known device for safety and convenience. At the outset it is proposed to erect a 5-story building, the intention being to ultimately erect a 12-story structure. The erection of the building will begin probably early in June, or as soon as sufficient leases have been signed for an amount of floor space sufficient to guarantee the success of the enterprise. Space has already been taken by several manufacturing concerns. There will be a connection between the Chamber of Commerce headquarters in the Union Central Building and the Permanent Exhibition Building.

The Society for Testing Materials

Provisional Iron and Steel Programme for the Meeting at Atlantic City June 24 to 28

Announcement is made of the programme for the sixteenth annual meeting of the American Society for Testing Materials, to be held at the Hotel Traymore, Atlantic City, N. J., June 24 to 28. The provisional programme, which is subject to change, provides for ten sessions—three on Tuesday, June 24, two on Wednesday, two on Thursday, two on Friday and one on Saturday. There will be recreation periods on Wednesday afternoon and Friday evening and a smoker on Thursday evening. The forenoon and afternoon sessions of Thursday will be devoted to papers and reports on cement, concrete and waterproofing and the forenoon session on Friday to ceramics and road materials. For the remaining sessions the provisional programme is as follows:

Tuesday, June 24, 11 a. m.

Minutes of the Fifteenth Annual Meeting.
Annual report of the Executive Committee.
Report of Committee A-3: On Standard Specifications for Cast Iron and Finished Castings. Walter Wood, chairman.
Report of Committee D-5: On Standard Specifications for Coal. J. A. Holmes, chairman.
Report of Committee D-11: On Standard Specifications for Rubber Products. E. B. Tilt, chairman.
Report of Committee E-6: On Papers. Edgar Marburg, chairman.

Election of officers.

Miscellaneous business.

Tuesday, June 24, 3 p. m. On Preservative Coatings.

Report of Committee A-5: On the Corrosion of Iron and Steel. Allerton S. Cushman, chairman.
Tests on the Rate of Corrosion of Metals. A. W. Carpenter.
Report of Committee D-1: On Preservative Coatings for Structural Materials. Percy H. Walker, chairman.
Report of Committee D-2: On Standard Tests for Lubricants. A. H. Gill, chairman.

Tuesday, June 24, 8 p. m.

Annual address by the president.
Report of Committee A-4: On Heat Treatment of Iron and Steel. Henry M. Howe, chairman.
The Influence of Mass in the Heat Treatment of Steel. K. W. Zimmerschied.
Effect of Size of Section on the Physical Properties Developed by Heat Treatment. J. H. Nead.
Conservation and Shipping Containers. B. W. Dunn.
Standard Specifications to Promote Safety and Efficiency in Explosives. C. P. Beistle.

Wednesday, June 25, 10 a. m. On Steel.

Report on Tests Made on Rail-Steel Concrete Reinforcement Bars under the Direction of Sub-Committee V of Committee A-1. W. K. Hatt.

Report of Committee A-1: On Standard Specifications for Steel. William R. Webster, chairman.
Rail Failures and Their Causes. M. H. Wickhorst.
The Resistance of Steels to Wear in Relation to Their Hardness and Tensile Properties. George L. Norris.
The Effect of Small Percentages of Vanadium on the Physical Properties of Steels. George L. Norris.

Wednesday, June 25, 8 p. m. On Steel and Wrought Iron.

Report of Committee A-2: On Standard Specifications for Wrought Iron. S. V. Hunnings, chairman.
Report of Committee A-8: On Standard Specifications for Cold-Drawn Steel. C. E. Skinner, chairman.
Oxygen in Iron and Steel: Value of Ledebur Method in Its Determination. W. R. Fleming.

Results of Tests of Welded Boiler Tubes. E. L. Lasier.
A Magnetic Criterion of the Mechanical Properties of a One Per Cent. Carbon Steel. Charles W. Burrows.
Results of Mechanical Tests on Heat-Treated Spring Steel. R. P. Devries.

Friday, June 27, 3 p. m. On Non-Ferrous Metals.

Report of Committee B-1: On Standard Specifications for Copper Wire. J. A. Capp, chairman.
Report of Committee B-2: On Non-Ferrous Metals and Alloys. William Campbell, chairman.

Metallographic Study of Lead-Tin-Antimony Alloys. William Campbell.
The Strength of Cast-Zinc Spelter. George C. Stone.
A Study of Bearing Metals and Methods of Testing. T. D. Lynch.

High-Tensile Bronzes with Special Reference to Tensilite. C. R. Spare.

Saturday, June 28, 10 a. m. On Testing Apparatus and Methods.

Report of Committee E-1: On Standard Methods of Testing. Gaetano Lanza, chairman.

Report of Committee A-10: On Hardness Tests. D. E. Doty, chairman.

Spherical Bearings. Mont Schuyler.

A Repeated Stress Testing Machine. J. B. Kommers.

The Use of the Strain Gage in the Testing of Materials. W. A. Slater and H. F. Moore.

Large Capacity Testing Machines in this Country and Europe. E. L. Lasier.

Miscellaneous business.

The April excess of exports of merchandise over imports was \$55,632,281. The month's exports were \$199,801,-201 and the imports were \$144,168,920. The total excess of exports for the 10 months ended April was \$561,952,271.

Steel Castings and the Substitutes for Them

Differences in Chemical Composition—Other Products Good for Certain Uses but They Are Not Steel

BY HENRY SOUTHER*

The misapplication of the term "steel casting" is notorious. It is applied to so many widely different iron compounds that the layman, represented by the purchasing class, finds himself much at sea. It is difficult for him to comprehend the difference between real steel castings, semi-steel castings, malleable iron castings (often called steel) and a group of metals, bearing trade names and having a composition defying classification by metallurgists, that are sold as steel castings but which are far from it.

The term "steel casting" should mean and does mean something definite. Such castings are made of the same kind of materials as the forged or rolled steel of commerce. Whether the steel be melted in a crucible, electric furnace, open-hearth furnace or in a Bessemer converter of the standard type, or a modified Bessemer like the Tropenas or Thomas process, does not alter this fact.

Chemistry of Steel Castings

The chemical composition of steel castings will be found to differ slightly, in accordance with the preference of the metallurgist in charge of the melting operations, or to suit the detail specification of the purchaser. All genuine steel castings are of the same nature as to composition and may be described in a general way as follows:

The carbon (entirely in the combined form) may vary as desired—from 0.15 to 0.80 per cent, or even more. The manganese may vary in like manner, from 0.20 to 1.00 per cent. The silicon also is under control and may range from 0.05 to 0.50 per cent. [The lower limit for silicon is rather applicable to billet steel than to steel for castings. The minimum is rarely below 0.20 per cent, for a first class casting.—Ed.] The phosphorus and sulphur are impurities, and the amounts present in the final product are dependent to a large degree upon the selection of the melting stock and the melting process. A characteristic analysis of a steel casting suitable for general machinery purposes may be considered to be about as follows:

	Per cent.
Carbon	0.30 to 0.40
Manganese	0.50 to 0.90
Phosphorus	0.06 to 0.08
Sulphur	0.06 to 0.08
Silicon	0.20 to 0.35

[The phosphorus and sulphur contents given above are higher than the usual specification permits. Present practice gives castings under 0.04 in phosphorus and sulphur.—Ed.]

Higher carbons may be ordered for certain uses, and purer (i.e., lower phosphorus and sulphur) material may be obtained if desired. Special alloy steels are also cast, as for railroad switch frogs, crossovers and the like.

All these steels are melted in a similar manner, are cast into molds at the characteristic and very high temperature of genuine steel, are of a crystalline structure when cast and are substantially free from graphite or any form of carbon other than combined carbon. Such material may be annealed, heat treated and refined the same as all carbon steel of commerce. They are cast steels just the same as is the ingot from which bar stock is subsequently rolled.

Semi-Steel

This name is most misleading. It is applied to several metals (iron compounds) but mostly to one that is nothing more or less than ordinary gray cast iron to which a percentage of steel scrap has been added during the melting. The resulting metal has all the characteristics of gray iron. The amount of steel added (from 10 to 30 per cent, generally) is too small to alter materially the gray iron characteristics, and the material remains cast iron.

The whole process of steel making is devoted to the removal of carbon and silicon from iron, with the result that the product obtained contains but relatively small amounts of these elements and no carbon in the graphitic form. While steel is added to iron up to as high as 50 per

cent., to produce the misnamed "semi-steel," even this large amount does not alter the character of the product; it retains all the characteristics of cast iron and has none of those peculiar to steel.

The addition of steel to the iron mixture does modify the composition of the resulting cast iron, providing that the modification be not offset by a simultaneous change in the pig irons used. That is, the tendency of the steel to lower the silicon in the mixture is easily offset by the substitution of a higher silicon pig-iron. This is also true to some slight extent with the total carbon.

Characteristic analyses of a genuine steel casting, gray iron casting and gray iron castings with different percentages of steel added are given below for comparison:

	Steel, casting, per cent.	Gray iron, per cent.	Gray iron with 10 per cent. steel, per cent.	Gray iron with 40 per cent. steel, per cent.
Total carbon	0.35	3.50	3.25	2.50
Graphitic carbon	None	3.00	2.65	1.75
Combined carbon	0.35	0.50	0.60	0.75
Manganese	0.50	0.50	0.50	0.50
Phosphorus	0.06	0.75	0.70	0.60
Sulphur	0.06	0.10	0.10	0.10
Silicon	0.20	2.50	2.25	1.50

The marked differences between a steel casting and semi-steel or gray iron as to composition are noticed in the amounts of total carbon, graphitic carbon, phosphorus and silicon.

Any of the cast irons given above may be obtained by a proper selection and mixing of pig irons. Consequently, there is no warrant for the name "semi-steel." Such metal is not steel in any sense of the word; it is gray cast iron.

Malleable Iron Castings

This is a proper term and one of long standing. It means what it says—a cast iron in a malleable condition. Malleable iron castings are often improperly called and sold as steel castings. Often steel castings are ordered and needed, and malleable iron furnished. More than one lawsuit has been based on such a cause.

Malleable iron as cast is a hard, white iron and is rendered malleable by prolonged annealing treatment. This white cast iron that is annealed in order to produce malleable iron is the same as found in chilled car wheels, chilled rolls and other chilled iron castings; and no other iron will do as well for the purpose. That the product is not steel will be readily observed from the following comparative analyses:

	Malleable iron casting	Genuine steel casting
Total carbon	2.80	0.30
Graphitic carbon	2.70	None
Combined carbon	0.10	0.30
Manganese	0.50	0.50
Phosphorus	0.20	0.06
Sulphur	0.06	0.06
Silicon	0.75	0.20

The differences here, as with the gray iron and so-called "semi-steel," are in the total carbon, graphitic carbon and silicon contents.

Pseudo Steel Castings

Other castings masquerading under the name of "steel castings" are found in trade and partake more or less of the nature of gray iron and malleable iron. They are made by mixing special pig irons, steel, ferro-silicon compounds and other special alloys. The physical characteristics of the resulting iron castings are modified to some extent by special methods of casting and cooling, and by annealing and partial annealing. The following analyses are from castings which are offered for sale as steel and are examples of the misrepresentation often practiced. All contain graphitic carbon in considerable percentages:

Sample	Carbon-			Mn.	Phos.	Sul.	Sil.
	Total	combined	graph.				
A	1.50	0.05	1.45	0.21	0.166	0.052	0.65
B	2.14	0.27	1.87	0.38	0.158	0.052	0.74
C	2.72	0.52	2.20	0.25	0.166	0.069	0.61
D	1.31	0.83	1.48	0.05	0.061	0.092	0.72
E	1.11	0.96	0.15	0.13	0.060	0.102	0.64

*President H. Souther Engineering Company, Hartford, Conn.

Sample	Carbon	Total combined graph.	Mn.	Phos.	Sul.	Sil.
F	2.19	0.65	1.54	0.02	0.045	0.540
G	2.91	0.69	2.22	0.16	0.044	0.228
H	1.27	0.56	0.71	0.36	0.192	0.065
I	1.13	0.36	0.77	0.08	0.052	0.102
J	1.51	0.45	1.06	0.13	0.082	0.085

Physical Qualities

Genuine steel may be made of any desired composition in order to obtain great strength, great toughness and powers of endurance under severe loads. In other words, the carbon content may be increased, alloys may be added, and heat treatment may be resorted to so as to produce steel castings of very high elastic limit combined with considerable toughness as indicated by elongation and reduction of area. Elastic limits as high as 50,000 and 60,000 lb. per sq. in. are easily obtainable, and coupled with such strength an elongation of 20 per cent. in 2 in. and a reduction of area of 40 per cent. are possible. These figures are not extreme.

In contrast with this, the other iron alloys passing under the name of steel castings are not under any such control and at the best are relatively weak and brittle. Such castings cannot be depended upon to show more than 40,000 to 50,000 lb. per sq. in. tensile strength, with a very indefinite elastic limit and in many instances none at all. This, coupled with the fact that the reduction of area and elongation are invariably low, limits the use of such materials very decidedly. These materials are not in the same class with steel castings and should not be substituted for steel without careful investigation and consideration.

Conclusion

Manufacturers and purchasing agents must guard against the practice of substituting these misnamed metals for genuine steel castings by learning what kind of metal they can use to advantage and purchasing under specifications drawn to cover such material in a clear and practical manner. Some of these misnamed irons may be just the right thing for certain purposes and most desirable. But the use of the word "steel" is not at all likely to enable one to obtain the same metal twice in succession under the present practice. Such practice is dangerous and costly. It may, however, be improved by the use of the same amount of care in the purchase of steel and iron castings as is used in connection with the purchase of other commodities, as, for example, babbitt metal. Not all castings called steel should be accepted as genuine any more than all babbitts are accepted as genuine. Some babbitts are 50 per cent. lead, at 6c. per lb., and some 90 per cent. tin, at 30c. per lb. Purchasers have known this for many years and have guarded against being misled by a trade name. Knowledge as to steel castings is not as widespread, and it is for this reason that this article is published. Buyers should not accept all castings called "steel" as such. Take precautions to buy the kind of a casting intended and really needed, and accept no casting as steel which contains graphitic carbon.

Some Large Steel Plate Special Fittings

For use in connection with the 60-in. riveted steel pipe for the North Side Reservoir, Pittsburgh, Pa., the James McNeil & Bro. Company, of that city, has just finished several steel plate special fittings. The fittings consist of five Y's 60 in. in diameter and one T with two 60-in.

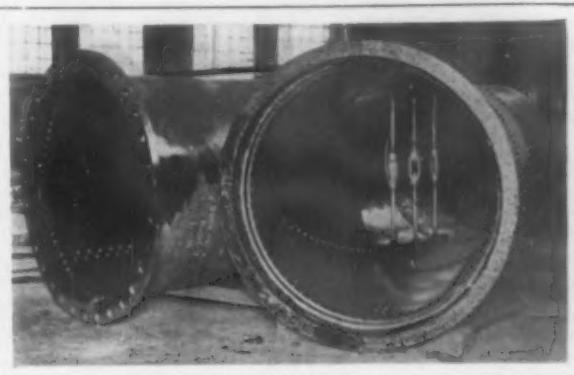


Fig. 2—An End View of the Fitting Shown in Fig. 1

outlets and one 48 in. in diameter. It was originally intended to make these specials of cast iron with a wall thickness of 1½ in., but the company proposed to make them of steel plate, and after careful consideration the city authorities accepted the substitution. Two views of one of the Y-fittings are given in Figs. 1 and 2, the latter being an end view. The offset T-fitting is shown in Fig. 3.

The Y's illustrated in Figs. 1 and 2 are made of ½-in. soft open-hearth flange steel plates and the two branches were united by a ¾-in. flanged plate, double riveted to the branches, as shown in Fig. 1. On the inside of this mantel plate were riveted two heavy angle irons with a baffle plate and three 2-in. bronze bolts with turnbuckles between. These bolts and turnbuckles can be seen in the right branch of Fig. 2. One branch of the Y's had a rolled steel flange for connection to the valve, while the



Fig. 3—A 60-Inch Riveted Steel Plate Elbow with a 48-Inch Outlet

other branch had a cast-steel bell end for a lead joint connection.

The same material was used for the T, which was constructed as a 60-in. elbow with a 48-in. outlet. The outlet was riveted to the elbow, so that its bottom was level with that of the elbow. The use of steel plate construction instead of the ordinary cast-iron one resulted in a considerable saving in weight. The shipping weight of the Y-fittings was approximately 14,000 lb. each, which was about one-third the estimated weight of the fittings if made in cast iron and that of the T was 11,000 lb., the saving in weight in this case being about the same.

The Brazilian Government has by decree extended until the end of the current year the preferential treatment of American flour, cement and other articles.



Fig. 1—A 60-Inch Special Y Fitting Made of Steel Plates Riveted Together

An Improved Die-Sinking Machine

What is apparently a distinct advance in the development of die-sinking machinery has been made by the Mellington-Northrup Company, Jackson, Mich. The profiling and the cherrying mechanisms are combined in one machine, and oscillating cutters are substituted for the usual revolving cutters in the cherrying device.

The accompanying engravings show the processes of die-sinking as applied to this particular machine. At the left of Fig. 1 a die is shown in place during the roughing-out or profiling operation. In this view the cherrying mechanism is seen not in use at the right of the roughing-out spindle. At the right of this engraving the die is shown shifted in place for the cherrying. The roughing-out spindle is here shown to the left, thrown out of gear by swinging it to one side on a hinge. The cherrying tool, shown ready to cut, is the distinctive feature of this machine for it is made to oscillate, instead of revolve, and after each cut it backs off or relieves itself. The cutter is allowed to move away from the work on the reverse by the knuckle joint attached to the forward end of the backing-off lever. Cutting can be done in either direction by a simple adjustment of the cam. The cherrying tool is shown in the extreme forward point of its arc of rotation of 180 deg. Additional cutters are set upon the bed plate in this view. Fig. 2 is a rear view, and displays the driving mechanism.

The chief claim of this machine is its economy. Noteworthy details of design are the thrust bearings in the spindle, that are made so that the wear will be distributed on both the upper and lower bearings. The table is built very rigid. It will take dies 4 ft. long.

Economy of upkeep is further increased by economy of operation. The loss in keeping a portion of the equipment idle part of the time has been found to be more than counterbalanced by reducing the handling of the dies to the minimum and by the additional advantage to the operator in having all his tools close at hand. The gearing that drives the cherrying cutter of the revolving type has been done away with, and cutters can be changed by a single workman easily in 5 min. From 14 to 20 hr. has been found to be an average saving on each set of dies. On a set of dies for a six-throw crankshaft a saving of 4 days is made. According to the Spicer Mfg. Company, Plainfield, N. J., which uses a machine, in any drop forging plant that

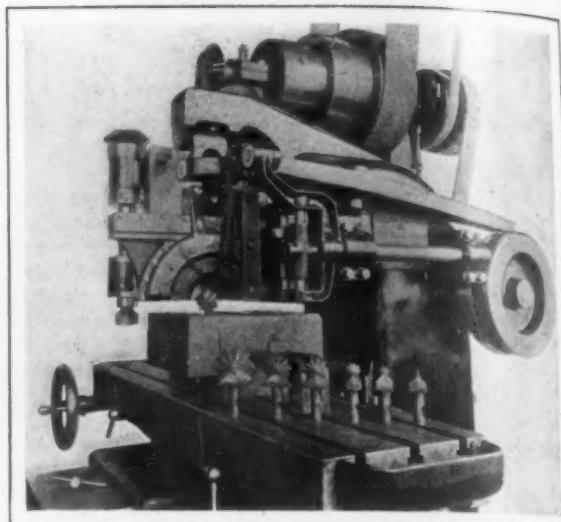


Fig. 2—The Die Shifted for the Cherrying Operation

does either sufficient jobbing or work of its own adapted to the machine to keep it in steady use, the saving effected by it will pay its cost in about a year.

The E. F. Hauserman Company, Cleveland, Ohio, has been organized to deal exclusively in factory building material and equipment. E. F. Hauserman, formerly vice-president Queisser-Bliss Company, Cleveland, dealer in building material, is president and George M. Mills is secretary. The company is located at 1412-15 Schofield Building. It has secured the agency for the Cleveland territory of the Detroit Steel Products Company, Alvey-Ferguson Company, G. Drouvé Company and Federal Cement Tile Company. The company will operate its own glazing and erecting departments.

The Charter Gas Engine Company, Sterling, Ill., builder of gas and gasoline engines and power transmitting machinery, shipped recently an aggregate of 310 hp. in four engine units rated from 60 to 100 hp. and a large number of 20 and 25 hp. engines for delivery in Wisconsin to be used in operating ensilage cutters.

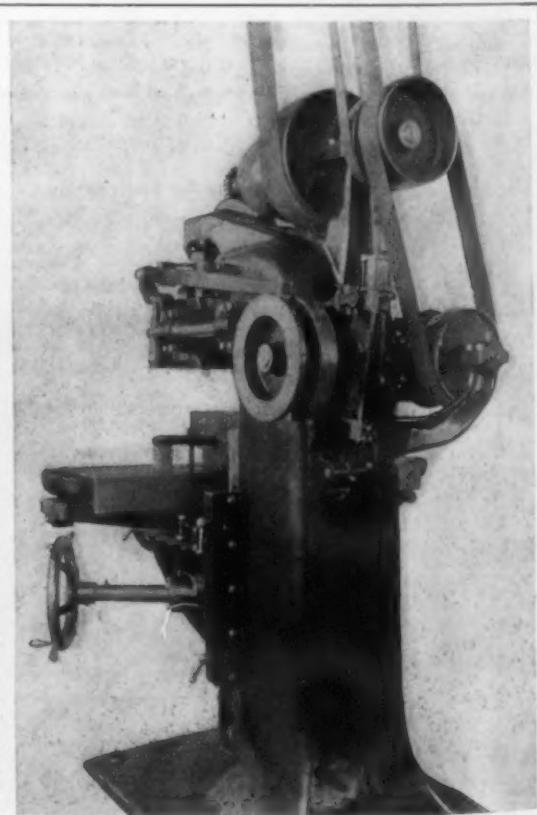
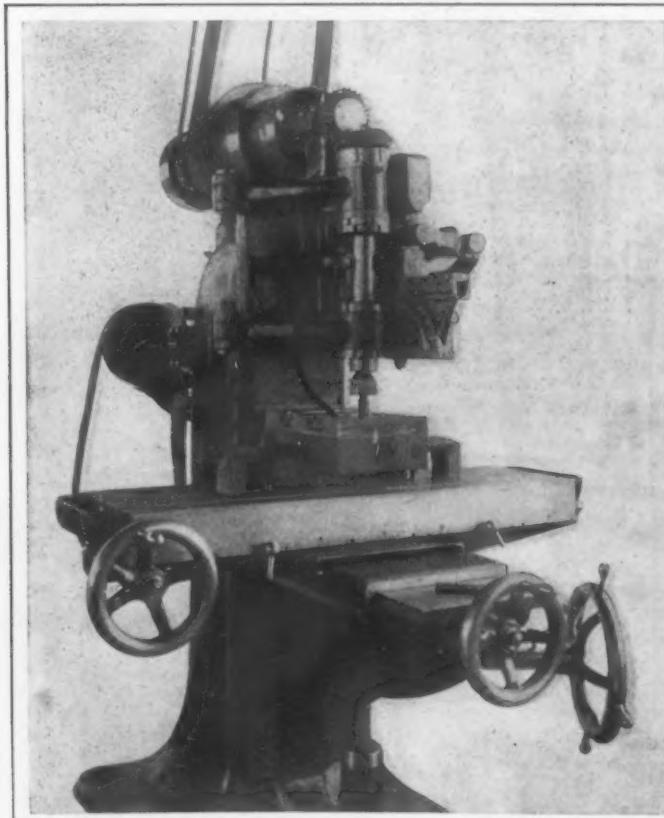


Fig. 1—Two Views of a New Die-Sinking Machine Showing a Die in Place for the Roughing-Out Operation and the Driving Mechanism Respectively

A Motor-Driven Gyratory Foundry Riddle

For the economical screening, mixing and tempering of molding and core sands, the Great Western Mfg. Company, Leavenworth, Kan., has developed a motor-driven riddle. This machine, which is known as the Comb's gyratory riddle, is portable, weighing less than 100 lb., which fact permits of screening the sand on the floor at the mold, where it is to be used.

The riddle can be hung from anything that will support 100 lb. in any part of the building or yard and it is simply necessary to connect the plug supplied with the machine to the nearest electric light socket. When the molder is digging a pit in the floor, the sand can be screened as it is removed from the pit, and when the pit is completed, the sand is screened ready to be used a second time. It is also possible to hang the riddle from a crane hook, and when this is done the machine can be hung over the flask of a large mold and the sand shoveled into the sieve, which will distribute the screened sand to the mold. The riddle is free from obstructions under or near the floor.

The machine has a gyratory motion, which is imparted as follows: An electric motor located well above the sieve rotates a weighted arm and this gives the whole machine a rotary pendulum action. The sieve is out of center as regards the weight, and as the center of gravity of the machine lies in or close to the weight, the sieve is given the desired agitated movement around the axis of rotation. The sieve is 20 in. in diameter and is held in



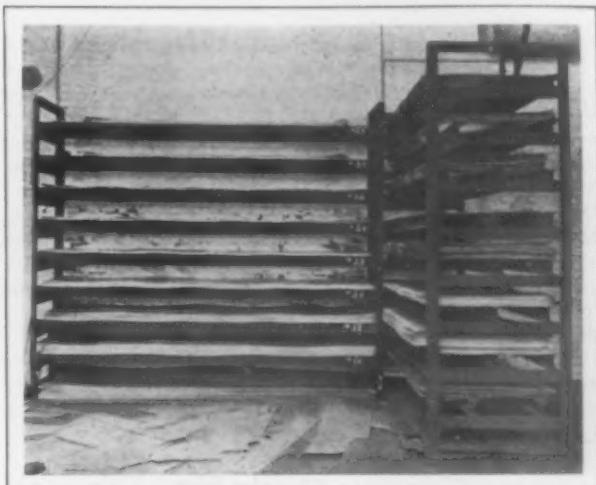
A New Motor-Driven Gyratory Riddle for Foundry Use with the Sieve Removed for Cleaning

place by spring clamping device. In this way the operator can remove the sieve for cleaning as shown in the accompanying engraving and can readily replace it in the machine after cleaning.

The Hatfield Machinery Company has been organized at Los Angeles, Cal., for the sale of machinery, specializing in gas engines, both stationary and marine, and compressed air machinery. The company has been appointed exclusive sales agent for a number of manufacturers. F. A. Hatfield, president and manager of the company, has been manager of the Los Angeles business of the Rix Compressed Air Drill Company for the past four years. C. S. Miller, also a member of the company, has been manager and secretary of the Hardsocg Wonder Drill Company, Ottumwa, Ia., for eight years. Office and show room have been established at 306-308 East Third street.

A Rack for the Storage of Metal Sheets

An interesting home-made rack for storing metal sheets is used by Kirk & Blum, Cincinnati, Ohio. The two racks are arranged to store sheets measuring 36 x 120



A Home-Made Storage Rack for Metal Sheets in Which Ease of Keeping Track of Stock is a Special Feature

in. and the sheets are piled on three 3-in. I-beams securely bolted to the cross angles. The uprights of the larger rack are 3 x 3 x 1/4 in. angle iron, while the smaller rack is supported by 2 x 2 1/2 x 1/4 in. angles.

As will be noted from the illustration, the sheets are stored flat, with the heavier gauges at the bottom of the rack. The different gauges are chalked at one end of the rack, but the most important feature is the easy manner of keeping track of the amount of material in stock. When the sheets are stowed away they are numbered at one corner from 1 up, thus making it very easy to ascertain at any time how much stock is on hand. For example, if the top sheet in the No. 20 gauge rack is chalked "87," this indicates that only this number of sheets of that particular gauge are in stock. Once a week the superintendent sends a report to the office that gives the number of the top sheet in all the different racks. In this way the purchasing agent can readily determine just how much stock is on hand and how long it will be before it becomes necessary to order a new supply.

German Electrometallurgical Progress

Victor Engelhardt, in Elektrotechnische Zeitschrift, April 3, 1913, gives an interesting account of the present status of electrometallurgy in Germany. He is the chief engineer of the electrochemical department of the Siemens & Halske Company. Heroult furnaces of 25 tons capacity have been put in operation in the Deutsche Kaiser works. The largest size induction furnace now in use is 13 tons. The Gesellschaft fur Elektrostahl Anlagen, an affiliation of the Siemens & Halske interests, and the owner of the principal patents for induction furnaces, has acquired the rights for the Girod arc furnace for Germany. This is the only change in the exploitation of different furnace types by the large electrical manufacturing companies, as the Heroult-Lindenberg electric furnace interests are affiliated with the Allgemeine Elektro Gesellschaft and the Nathasius interests with the Bergmann concern.

The melting of ferromanganese by means of electric furnaces is extending, the advantages being evident. Thirty German steel works use large quantities of ferromanganese in converters; of these 12 had electric furnaces for melting the ferromanganese in use or in process of erection at the end of 1912. Five of these were installed by the induction furnace—Girod interests, three use Heroult furnaces, two Keller and two Nathasius.

According to the American consul-general at Moscow, the production of copper in Russia has greatly increased in the last few years. In 1906 the production was 10,000 tons, and was not equal to one-half the requirements of the country. This increased to about 30,000 tons in 1912. At present all domestic requirements of electrolytic copper are met with metal of Russian origin.

Light Weight Reciprocating Motor Parts*

A Brief for Magnalium, An Alloy
of Aluminum and Magnesium

— BY MORRIS R. MACHOL.† —

For several years the problem of reducing the weight of the reciprocating parts of gasoline engines has been absorbing the attention of automobile engineers. The first attempts were along the line of cutting down the weight of the cast-iron pistons, making the walls thinner and machining the inside as far as possible. Cast-steel pistons were then tried, and recently experiments have been made with steel forgings. Aluminum will not stand the wear of piston travel, but magnalium, which is an alloy of aluminum and magnesium, and is lighter than the former, has been used successfully for some years for the cylinders of gasoline engines. It has also been used as a piston in an iron cylinder.

The ordinary grade of cast iron used for pistons has a tensile strength of 18,000 to 20,000 lb. per sq. in. and a specific gravity of 7.5, while the tensile strength of magnalium is approximately 23,000 lb. per sq. in. and the specific gravity is 2.5. As compared with cast iron, magnalium is tough, is not as hard and gives a better bearing metal. The following table gives the results of some experiments that were made to determine the coefficient of friction of babbitt metal, phosphor bronze and magnalium as bearing metals at a speed of 280 r.p.m. and pressures ranging from 250 to 400 lb. per sq. in.:

Coefficients of Friction of Different Metals for Different Pressures

Pressure, lb.	250	300	350	400
Babbitt	0.0075	0.0105	.....	.....
Phosphor bronze	0.0069	0.0076	0.0085	0.0096
Magnalium	0.0056	0.0060	0.0062	0.0066

One of the advantages of magnalium for piston purposes is the reduction in vibration. The thermal conductivity of the alloy is fourteen times as great as that of iron, and the heat is carried from the dome of the piston to and through the cylinder walls to the water jackets. In practice, the dome of a magnalium piston would be cooler and the walls of the piston warmer than in the case of iron pistons under the same conditions. An engine with magnalium pistons is less liable to have preignition than one with iron pistons.

Reducing the stress on the connecting rods naturally means that the wear on the bearings at both ends is reduced. The use of magnalium pistons has a beneficial effect upon the connecting rod bearings and indirectly upon the crankshaft bearings. Since magnalium is a good bearing metal it is practicable to fasten the wrist pin in the connecting rod and allow it to make its own bearing in the magnalium piston, experience having shown that there is no tendency whatever for the bearing to pound or to wear loose. The acceleration of a motor is dependent to a very large extent on the weight of the reciprocating parts, and if magnalium pistons are used, the motor will accelerate very much faster. In every case of which the writer has any knowledge where magnalium has been used for connecting rods, they have made their own bearings and both ends seem to be standing up just as well as pistons of the conventional types.

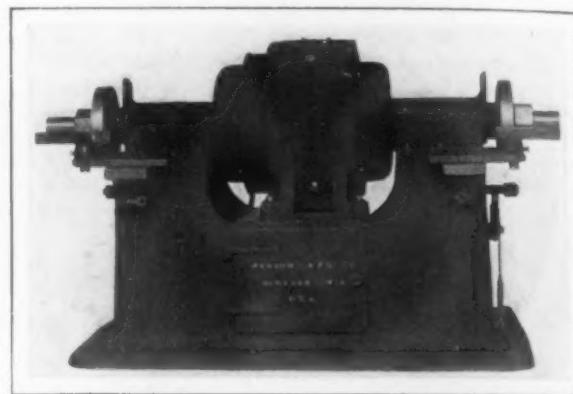
About eight or nine months ago experiments were made with magnalium connecting rods, in a seven-cylinder radial type motor, having a bore of $3\frac{1}{2}$ in. and a 4-in. stroke. Two of these motors so equipped developed 50 hp. at 1400 to 1500 r.p.m. The connecting rods were put in as an experiment and it was not expected that they would stand up for any length of time, and consequently no arrangements were made for taking up the bearings. The holes at both ends of the connecting rods were simply bored and reamed and no bushing of any kind used. There is no sign of deterioration on these rods and no tendency to bend or wear. They are in the shape of a maltese cross and are a little heavier in section than the alloy steel rods previously used, while they actually weighed one-half as much as the steel rods they replaced.

At the present time a 14-cylinder, 80-hp. radial type aeroplane engine with a two-throw crank, $3\frac{1}{2}$ -in. bore

and a 4-in. stroke is being built. The engine is air cooled and the cooling ribs are sheet magnalium. The cylinders are made of steel tubing, and the cylinder heads will probably be magnalium and the pistons and connecting rods; the push rods and valve guides and the crank-case are magnalium. In every place where magnalium was substituted for cast iron or steel a sufficient section was allowed to give more strength than the steel part would have given, and, even then, it is expected there will be a saving of nearly 100 lb. in weight, the complete motor weighing less than 200 lb.

Motor-Driven Foundry Grinding Machine

For use in a foundry for operating on heavy steel casting work, the Ransom Mfg. Company, Oshkosh, Wis., has brought out a new motor-driven dry grinding machine. The machine is arranged with the armature shaft extended to receive the grinding wheels on both ends. When a direct-current motor is used, the machine is provided with the builder's speed controller, which, it



A New Heavy Type of Motor-Driven Grinding Machine Designed Especially for Foundry Use

is pointed out, furnishes a safeguard against the possibility of speeding the motor too fast, and also enables the grinding wheels to be operated at the proper speed until it is worn down to the collars. The bearings of the machine have either compression grease cups or ring oiling devices.

The direct-current motor has the armature wound on a sleeve that in turn is pressed on the arbor, a feature which it is emphasized makes repairs easy. The motor used has four poles in addition to a set of interpoles. The rise in the speed is accomplished by external field resistance, and the interpolating arrangement is provided to secure good commutation.

The following table gives the principal dimensions and specifications of the machine:

Diameter of spindle, in.	3
Diameter of bearings, in.	$3\frac{1}{4}$
Length of bearings, in.	15
Total length of spindle, in.	80
Diameter of grinding wheels, in.	24
Face width of grinding wheels, in.	4
Power required, hp.	10
Weight, lb.	4000

While the 24-in. wheel is the size for which the machine is regularly designed, it can be used for larger diameter wheels, and in place of the 10-hp. motor a 15-hp. unit can be furnished, if desired. While steel guards with exhaust pipe connections and safety collars are not included in the regular equipment of the machine, they are furnished if desired.

Fire visited the plant of the Lumen Bearing Company, Buffalo, N. Y., Sunday, May 11, destroying the coke and sand sheds and the wood buildings at the rear of the main foundry. While such of the buildings as were of wood were consumed, the destruction was stopped by the concrete floors and roof of the pattern shop and by the fire doors between it and the pattern storage building acting automatically. No damage was done to patterns or foundry proper, and the work of replacing the burned portion with fireproof buildings is already under way. No interruption to business was caused and all orders are being filled with the usual promptness.

*From a paper read before the Metropolitan Section of the Society of Automobile Engineers.

†Metal Department, G. A. Crayen & Co., New York City.

President Farrell's Recital Takes a Wide Range

Five Days of Testimony in the Steel Corporation's Behalf—Large Outputs by Competitors in All Lines

President James A. Farrell, of the United States Steel Corporation, finished his direct testimony in behalf of the corporation on Friday, May 16, having been on the stand for five days. His examination covered a great variety of subjects, following his remarkable story of the building up of an enormous export trade in steel products in all quarters of the globe, as detailed in last week's report. On Wednesday, May 14, attention was given to the proportion of the total production of the country made by various subsidiaries of the Steel Corporation.

American Bridge Company Competitors

At the request of counsel, Mr. Farrell named a very large number of active competitors of the American Bridge Company in 1911, when the dissolution suit against the Steel Corporation was brought. He showed wonderful acquaintance with the production of each of the competitors and their markets. "At the present time the American Bridge Company has about 300 competitors. Since 1901 all these competitors have greatly enlarged their plants," and concerns which had no fabricating departments have built such facilities. There have also been entirely new plants erected, such as that of the Lackawanna Bridge Company. Mr. Severance submitted the following exhibit showing the output of bridge and structural material in the country each year since 1903, and including 1911, together with the American Bridge Company's production:

	Total prod., tons	American Bridge Co. tons	Independents, tons	Per cent., A. B. Co.
1911	2,489,000	750,000	1,739,000	30.1
1910	2,174,800	691,800	1,483,000	31.8
1909	2,195,000	720,000	1,475,000	32.8
1908	2,199,000	708,000	1,491,000	32.2
1907	1,884,200	679,200	1,205,000	36.0
1906	1,795,800	670,800	1,125,000	37.4
1905	1,716,600	621,600	1,095,000	36.2
1904	1,640,000	624,000	1,016,000	38.0

Percentage of Pipe and Tube Business

"Fifty-six per cent. of the pipe and tubes made in the United States were made by the National Tube Company in 1901," said Mr. Farrell, and "37 per cent. in 1911. Taking cast and wrought iron pipe in every plant in the similar industry the National Tube Company did 23 per cent. of the tube business of the country in 1911. At the time of the organization of the Steel Corporation the National Tube Company was a competitor of other subsidiaries only to the extent of about 25 or 30 tons of sheets per day."

Asked if any foreign seamless tubing was shipped into this country, Mr. Farrell said, "Yes, occasionally. Thyssen & Co., at Mulheim, Germany, are now delivering an order for 6000 tons to the Pacific Coast. The Mannesmann Company, of Germany, has been a pioneer in the business and owns valuable patents. It has a very large plant in Germany, one in England and one in Austria. It is building another plant in Germany and is about to build a large plant in this country."

Mr. Farrell said that the American Steel & Wire Company did not produce steel bars, hoops or bands to any material extent in 1900, and did not compete with products of other subsidiaries, with the exception of cotton ties, which were made by the American Steel Hoop Company.

"In 1901," he stated, "the American Sheet & Tin Plate Company produced 73 per cent. of the country's output in sheets and tin plate and at present about 56 per cent. In 1911 the percentage was larger—60.7—but since then competitors have enlarged their capacity."

The American Steel Hoop Company plants of the Steel Corporation have been almost entirely rebuilt to enlarge their capacity, increase their efficiency and to enable diversification of their product. "It was very expensive," said the witness. "The former owners of the American Steel Hoop Company plants would scarcely recognize them since the alterations have been made. These have proceeded constantly since the organization of the corpora-

tion. The steel hoop mills meet with a very sharp competition. Competitors have greatly increased their production by erecting new plants and by extending old ones."

Work in Panama and the Philippines

Asked about work done by subsidiaries of the United States Steel Corporation for the Government, Mr. Farrell told of the Government work done in the Philippines for the past ten years, in the building of Fort McKinley, also work on docks, bridges and in other lines. "This is all contract work, secured if we are the lowest bidders. If we are not, it goes to other people." Asked if other companies had secured portions of Government work in the past ten years, he told of the McClintic-Marshall Construction Company, Pittsburgh, securing a large lock gate contract on the Panama Canal. In the Philippines a German firm furnished part of the work.

Mr. Severance: What work, if any, have you done, or has the American Bridge Company done on the Panama Canal?

Mr. Farrell: We have done about \$8,000,000 worth of work there for the Government so far. We are building the emergency dam, building transmission towers and the administration building, and a machine shop, involving about 6000 tons, and we have been doing a great deal of work outside of the lock gates. I think we have done the major portion of the work, and it has always been work that we have had to get out pretty promptly, sometimes having to set aside other work to accomplish the deliveries required. It requires a large capacity to get the work out within the time permitted. It has all been secured by competitive bidding.

Asked who sold the material to the McClintic-Marshall company for use in the Panama lock gates, Mr. Farrell said, "We sold the most of it to them."

Practice in Railroad Buying

Taking up the American Sheet Steel Company, Mr. Farrell gave 1900 as the year of its organization. "It had 15 competitors then, but by the time the Steel Corporation was organized and the Sheet Steel company taken in there were 28 competitors, as 13 new concerns had sprung up. It now has 36 competitors. In 1901 the Sheet Steel company controlled about 67 per cent. of the country's business, and in 1911 the American Sheet & Tin Plate Company controlled about 36 per cent. Competitors are becoming more and more active, and many of them are large and strong concerns. Of these part were established since the corporation was organized."

In answer to a question as to competition in railroad bridges, Mr. Farrell said that the work is invariably let on open bids and that scores of companies compete for the business. Asked about railroad purchases of rails and other materials, he said that these are made by a road from plants on its own lines. Usually the road followed the policy of buying from firms which used its lines most in transportation of raw, semi-finished and finished iron and steel products. When possible the company furnishing the rails usually furnished the spikes, splice bars and other accessories. If the steel company did not itself make these other products, it sometimes purchased them from other companies. The Carnegie Steel Company, for example, purchases spikes and some other accessories from the Illinois Steel Company.

Concerning the production of carwheels, Mr. Farrell supplemented his earlier testimony by stating that of the 2,600,000 car wheels, both iron and steel, turned out in this country each year, the Carnegie Steel Company makes 300,000. This is about 11 per cent. of the total, but is 30 per cent. of the 1,000,000 steel wheels made in the United States.

Prices on Export and Domestic Business

Supplementing the testimony given by Mr. Farrell on Tuesday relative to export trade in steel products and the prices realized in foreign markets, the Steel Corpora-

tion's counsel introduced an exhibit comparing these prices for 1904, 1907, 1910 and 1912. Selections are made for the tabulation below in which *d* refers to average domes-

Product—	1904	1907	1910	1912
Bessemer rails	<i>d</i> \$27.31	\$27.84	\$27.82	\$28.03
	<i>e</i> 19.40	*28.03	23.15	24.42
Light rails	<i>d</i> 21.56	32.40	26.69	25.50
	<i>e</i> 20.36	30.73	24.58	24.08
Bess. blooms, billets, etc.	<i>d</i> 19.46	25.46	22.40	19.49
	<i>e</i> 16.07	21.02	—	*19.62
Open hearth do.	<i>d</i> 20.31	27.66	24.38	20.25
	<i>e</i> 16.46	*28.23	20.61	19.71
Small Bess. billets.	<i>d</i> 20.34	25.18	22.84	18.44
	<i>e</i> 14.78	22.12	*25.95	*19.03
Angles	<i>d</i> 31.12	35.25	32.05	27.30
	<i>e</i> 24.69	32.51	28.59	25.83
Structural shapes	<i>d</i> 36.98	40.58	—	—
	<i>e</i> 32.95	*41.98	—	—
Merch. bars and bands.	<i>d</i> 31.29	34.36	32.56	28.14
	<i>e</i> 23.93	32.83	30.24	26.60
Cotton ties	<i>d</i> 33.98	44.48	34.77	32.31
	<i>e</i> *41.41	37.10	*38.05	*35.45
Spikes, bolts, etc.	<i>d</i> 38.35	46.71	42.74	36.65
	<i>e</i> 37.22	46.56	*46.64	36.03

tic prices by the ton, *e* to export prices, and dagger (†) to quotations by 100 lb., while the asterisk (*) indicates a higher price on export than on domestic sales:

Product—	1904	1907	1910	1912
Steel ties	<i>d</i> \$25.83	\$46.57	\$31.94	\$33.80
	<i>e</i> *28.85	35.29	31.57	29.32
Tin and terne plate†.	<i>d</i> 3.83	4.42	4.34	4.28
	†	3.02	*7.41	*4.74
Black plate†.	<i>d</i> 2.37	2.50	2.41	*4.71
	†	1.81	2.20	2.04
Galv. sheets	<i>d</i> 62.02	72.87	64.60	56.72
	<i>e</i> 59.81	68.68	60.45	58.78
Furniture spring wire.	<i>d</i> —	50.46	47.40	43.69
	<i>e</i> —	*53.90	*48.82	46.16
Wire nails	<i>d</i> 38.91	43.63	40.81	38.48
	<i>e</i> 35.07	*45.40	36.89	34.80
Horse shoes	<i>d</i> 80.18	78.52	78.26	77.54
	<i>e</i> 69.03	*79.92	*79.98	73.92
Railroad spikes	<i>d</i> 34.33	49.08	37.35	35.44
	<i>e</i> *37.19	46.56	35.78	*38.70
Flat special wire.	<i>d</i> 138.07	136.82	134.55	117.90
	<i>e</i> *152.37	*190.49	*137.52	*146.43
Furniture springs	<i>d</i> 88.44	88.39	91.29	91.44
	<i>e</i> *97.76	*102.73	*111.89	*96.00

The Tennessee Purchase—No Deals to Fix Prices

Under questioning from counsel for the defense Mr. Farrell, on Thursday, May 15, discussed the properties of competitors of the United States Steel Corporation, especially those which were well integrated, showing that the corporation was far from having a monopoly of the iron and steel trades. In this connection the merchant bar business was mentioned and Mr. Farrell stated that the corporation produces about 40 1/10 per cent. of the country's output of steel bars, and the independents 59 9/10 per cent. The Steel Corporation, which makes no iron bars, produces 27 3/10 per cent. of the iron and steel bars combined, leaving 72 7/10 per cent. as competitors' production.

The Tennessee Company Not a Competitor

Mr. Severance, of counsel for the defense, asked:

Do you know the nature of the products of the Tennessee Coal, Iron & Railroad Company at the time it was acquired by the Steel Corporation? A. They were largely pig iron and rails, and the company had a merchant mill, on which bars, small shapes and some classes of plate were rolled. The capacity was about 60,000 tons a year in shapes and plates. The big production was pig iron. The United States Steel Corporation plants were not sellers of pig iron.

Q. Did the subsidiaries of the United States Steel Corporation purchase pig iron? A. Occasionally.

Q. Was the steel plant of the Tennessee Company equipped for foreign trade at the time it was acquired? A. It was not.

Q. In what particular was it lacking? A. It lacked suitable auxiliary machinery, finishing rolls, the proper manipulators for the hot beds, machinery for drilling oval holes and machinery for milling the ends of the rail. On the first order we sent to the Tennessee Company in 1908, we expended \$56,000 on its auxiliary milling machinery to finish that one order.

Q. Where was it destined? A. Argentina.

Q. Previous to that time had you known of the Tennessee Company in the market as a competitor of the corporation for foreign business? A. No.

Q. What was the condition of the steel plant of the Tennessee Company as to efficiency at the time it was acquired? A. That perhaps could be answered best by the amount of money which had to be spent to put it in efficient condition.

Q. How much have you expended on that? A. Up to the present time about \$23,500,000. On the rail mill and Ensley plant, about \$8,000,000 has been expended. The balance of the money had been expended in developing ore and other properties.

The Tennessee Company as a Rail Producer

Q. What was the necessity of expending that much money on the rail plant? A. It was not in condition to produce rails economically, and necessitated large expenditures to arrive at that condition.

Q. Did you ascertain whether that plant was producing rails at a profit at the time it was acquired? A. It was not. We went over the records of the cost of production of the rails prior to the acquisition by the Steel Corporation. The records show that on an order of 56,000 tons of rails which was placed with the Tennessee Company by the Harriman Lines 27,000 tons was produced at a cost of \$32.45 per ton, which was \$3.45 per ton higher than the price at which the rails were sold.

Q. Was the company obliged to take back any rails on account of their being defective? A. No rails were actually taken back, but rails were shipped to the Pacific coast and various parts of the West, and complaints were made as to their quality. The company's inspectors were sent out to examine the rails, and allowances were made, and the rails were used in side tracks and not in the main line.

Q. State in some detail in what line the large expenditure had been made, aside from the rail mill and for what purposes. A. In building by-product coke ovens, requiring very large sums; in the construction of huge reservoirs, in order to insure a sufficient supply of water for operating purposes; in opening up mines; in increasing the capacity of the blast furnaces, and a general rehabilitation of the work and property.

In reply to a question, Mr. Farrell stated that outside of the order from the Harriman Lines he had never heard of the Tennessee Company as a seller of rails and its capacity as it then existed was not sufficient to make any impression on the rail market of the country.

Q. At the time of taking over the Tennessee Company, was that company being operated at a profit—a substantial profit? A. No. The company did not have sufficient capital to make improvements on the rail mills to bring them into shape to compete economically with other rail mills in the country. When we took over the plant it was not as a whole operated efficiently. The labor employed was largely colored labor and some convicts. The employment of convict labor has been entirely done away with.

Corporation Abolished Wage Shaving at Tennessee Plant

Q. Were all the contracts for convict labor extinguished at one time, or gradually, as they went out? A. As fast as the contracts expired they were discontinued. The last ones were wiped out January 1, 1913. The company was employing about 700 convicts when we took the property over.

Q. What was the system of paying wages? A. In the year prior to the taking over of the company by the Steel Corporation, an item of \$150,000 was earned as the result of a wage-shaving system that existed there. This system was not peculiar to the Tennessee Company; it applied to the companies generally located in that district. Pay-day came every two weeks but every few days the paymaster would go to a mine or a plant, and instead of waiting for the regular pay-day many of the laborers would accept a discount of 10 or 15 per cent. on their wages and get the cash. The colored workmen were rather disposed to cash in as often as they could. This wage-shaving system was a regular custom of all companies operating in that district at that time and exists to-day with some companies.

Q. Does it exist to-day with the Tennessee Company? A. It does not; it was discontinued by President Crawford of that company immediately after the Steel Corporation took it over.

Mr. Farrell stated that \$522,000 has been expended by the corporation since the acquisition of the property in 1907 for sanitary improvements, emergency hospital, bathhouses and general welfare work. These appropriations were made, as are all appropriations of over \$5000, after a thorough investigation as to the necessity of the expenditure by the Finance Committee of the Steel Corporation.

The costs in the Tennessee Company's plant, he said,

are being improved upon, lowered, and are getting in better condition. Business has been increased to a large extent, the mill having been operated almost continually since it was acquired. The capacity has been increased and the product has been diversified. The pig-iron capacity is about 1,000,000 tons per annum now. The steel capacity is about 600,000 tons per annum, but was about 150,000 tons when it was taken over. The ore there is suitable for the open-hearth process, but not for making Bessemer steel, the company being obliged to bring its ingot molds and rolls from the North.

Mr. Farrell named a long list of products made in the Northern mills of the Steel Corporation that were not made in the Tennessee Company's plant at the time it was taken over. It was not then selling steel in the Northern market. It sold steel in Atlanta and various places in the South. At the present time the company is handicapped as compared with the Maryland Steel Company at some points in the South. The freight rate from Birmingham to Galveston, for instance, is \$3.40, all rail. The rate to Galveston from Baltimore, all water, has never been higher than \$2.50 by schooner or sailing vessel. This condition continues. The Maryland Steel Company has an advantage over all other companies located on tidewater.

The Use of Old Material

Mr. Severance then took up the subject of rerolling. Mr. Farrell said the product of rerolling mills is sold in the market in competition with the regular steel products of similar type. The railroads sell their worn rails at various prices, but under normal conditions at \$14 to \$15 a ton. The rerolling mill, with no investment except a heating furnace and a pair of rolls, can put the old rails into marketable material for \$4 or \$5 a ton. There are over 50,000,000 tons of rails in track in this country, and old rails are constantly being taken out, so that there is a good supply. The total production of the rerolling plants in this country is between 500,000 and 600,000 tons per year. After describing the McKenna method of renewing rails by rerolling worn heavy sections into somewhat lighter ones fit for another period of service, Mr. Farrell spoke of the bars made by rerolling old rails. This industry, he said, has had a tremendous development as the result of the increased use of bars in concrete reinforcement work, and the increase in the consumption of mine rails and bedstead angles. In some respects rerolled steel is superior to the regular steel for certain purposes. The rerolling industry is rapidly increasing. It is an industry that can be started anywhere where a large accumulation of old rails is to be had.

Mr. Severance then took up the subject of scrap steel and asked the approximate amount of scrap annually available for steel making. Mr. Farrell said from 1,000,000 to 1,500,000 tons is available in the open market, the steel works using much scrap produced by themselves. The supply is constantly increasing. A large percentage of the new material constantly comes back to the mills in the form of scrap. This scrap takes the place of about twice its tonnage of iron ore in the making of steel. The price of scrap has no relation to steel billets, but follows to some extent the price of pig iron.

He Had Recommended Buying Union Steel Company

The acquisition of the Donora plant of the Union Steel Company was brought up. Mr. Farrell said he asked Mr. Palmer, the president of the American Steel & Wire Company, at various times and in fact quite frequently, to urge the purchase of that plant on the part of the corporation, because of its peculiar adaptability to the export wire trade. This business was steadily increasing. After the plant was bought, it was put on export business, and is now being operated to capacity in the foreign trade. Last year the Donora plant produced and shipped 83,000 tons of wire products for export. Mr. Farrell stated that he had nothing to do with the negotiations for the purchase of the plant and that his brother, William H. Farrell, who built it, had no financial interest in it.

How Market Prices Are Established

Taking up the subject of prices, Mr. Severance asked:

Q. From your experience as a salesman, are you able to state what makes the market price of steel? A. The price at which the majority of the tonnage is being sold in the market makes the market price.

Q. In what way is the market price evidenced to the trade generally? How do they get knowledge of it? A. Largely through the trade papers that both seek and impart information; that is, they seek information from the buyers of material as to the prices that are available. They seek information from the manufacturers as to the prices they consider are current or they are selling at, and the market prices published by the papers are seldom criticised by either buyers or sellers.

Q. How are these papers equipped to secure this information that you have told us about? A. They have offices all over the country, and staffs of reporters who are specially trained in trade work; that is, in the iron and steel business. A great number of them are people who have been in the iron and steel trade.

Q. In selling iron and steel, is there any exchange upon which they are traded? A. No; sellers of iron and steel have to find their market. There is no exchange such as the cotton exchange or the coffee exchange; consequently they are obliged to find the market price. They find the market price through seeking orders and through the trade newspapers and other information such as given to them by their customers, as to what they are being quoted by other sellers.

Asked about the revising of price lists, Mr. Farrell said that the prices on some material, for several months, have been on the same basis. Take steel bars, for instance; the price has been \$1.40 per 100 lb. f.o.b., Pittsburgh.

Q. Now, does the fact that a price remains on a uniform level, as you have stated, for several months, indicate anything as to whether the market is not an entirely competitive one? A. Only in the minds of theorists and economists.

Q. What is the fact, as to whether the market, during this period you have stated, has been a competitive market? A. It has been competitive, but the demand has exceeded the supply, and consequently the prices remained on about the same basis.

No Agreements with Competitors as to Prices

Q. During this period you have spoken of, when the price of bars has remained on a level, has there been any understanding, agreement or pool or anything else between the different steel manufacturers as to what the price of bars shall be? A. No. I might add that most of our competitors have been selling them at \$1.50 to \$1.60 per 100 lb., getting premiums for them, but our price has been \$1.40.

Q. I would like to ask you, in considering the market price, is what is known as the premium or bonus for quick delivery considered in making the market price? A. Not any more than would be the price made by a manufacturer in encountering some vicissitudes of a financial nature, which would necessitate his sacrificing material; that would not be considered the market price. Neither would the premium price be considered the market price. The market price is the price at which the majority of tonnage is sold on the market. When a product is sold ahead, the way the mills have been situated in the last few months, the normal and usual way of making delivery is in the order in which the orders are taken.

Q. Has it been the custom of the Steel Corporation to fill their orders in that way? A. Entirely so.

Q. What do you mean, then, by the payment of bonus or premium to some competitors of the corporation for prompt delivery, as relating to the order in which contracts have to be filled? A. I could not answer that intelligently, because I do not know. I do not intend to say here or any other time what our competitors' practices are. I do not know what they are, but it is a fact that people have come to us and told us that they could get material from our competitors by paying a premium, and they have offered us a premium to deliver our material sooner. But we have said no; that we would deliver it in the order in which the contracts were received. We know that some customers have bought material outside and have endeavored to charge us with the difference, but our contracts were always made so that our obligations could be covered, and we have not been compelled legally or morally to pay any such differences. There have been premiums of \$8, \$9 and \$10 a ton paid during the last year for materials. We have never done any of that sort of business.

Q. Since February, 1907, when you became president of the United States Steel Corporation, will you state whether or not there has been between the Steel Corporation or its subsidiaries any contract, agreement, arrangement, pool or understanding whatever, in fixing prices and limiting the output, or fixing the quarters or localities where its several subsidiaries might sell their product? A. No.

Policy of Maintaining Reasonable Prices

Q. In the case of an active demand, whose prices are usually higher, the large producers or the small producers? A. The small producers.

Q. How do you account for that? A. Because a small producer usually seeks out business that is more remunerative than the general run. The large manufacturers have their regular customers and are more disposed to have a fairly reasonable price. They steer a middle course in prices.

Q. In the case of a dull market, where the demand is less than the supply, who ordinarily sells at the lower price, the large producer or the small producer? A. In most cases the small producers.

Q. Why is that? A. Because the large producers realize that if they sell at a low price it makes the market for their entire tonnage.

Q. Since the organization of the Steel Corporation, what has been its policy as to maintaining stability of price or otherwise, so far as it has come to your knowledge? A. The policy has been to maintain a stable market so far as possible. It has, of course, to consider the question of wages, which would be apt to suffer in the event of any radical reduction of price, and the question of dividends, and the question of sufficient earnings to maintain the upkeep of the plant.

Q. Has the quality of steel products been bettered otherwise since organization of the Steel Corporation? A. Constantly improved.

Q. In your judgment, taking into account the character of the product and the demand, have the prices charged from time to time by the Steel Corporation been fair and reasonable to the public or otherwise? A. Reasonable.

The Price of Rails

Q. There has been some testimony in this case relative to a certain price of \$28 a ton for steel rails. How long, as far as you know, have standard rails been quoted at that figure? A. A good many years.

Q. Are all the rails that are sold in the market to railroads sold at \$28 a ton? A. No.

Q. What percentage of rails that are now consumed and have been consumed for the last few years by the railroads have been sold on that basis, to the best of your belief? A. About 30 per cent. Basic open-hearth rails have been sold to the extent of about 60 per cent. These rails sell from \$1.50 to \$2 a ton higher than Bessemer rails. They are made to special analysis.

Q. You have said 30 per cent. of standard specification Bessemer rails, and about 60 per cent. open-hearth. What are the other 10 per cent.? A. Alloy rails or electric rails. We have an electric plant at South Chicago where we have produced up to the present time about 8000 tons of rails made by the electric process. These rails are being tried on the large trunk lines and cost us to manufacture about \$40 a ton. We have sold them for that price for the purpose of introducing this kind of rail, our idea being to make something that will satisfy the requirements of the traffic. We also manufacture what are known as manganese rails which command a high price. We have just filled an order for the New South Wales Government at \$150 a ton. They are rails which are made for severe work in curves and at other places. Nickel alloy rails, made to the special specification of buyers, sell from \$34 or \$35 a ton to \$50 and \$60 a ton. We made a lot of nickel alloy rails for the London underground tramways. The Pennsylvania Railroad Company buys from its own specification, as do most of the other trunk lines. The Pennsylvania buys about 250,000 to 300,000 tons of rails a year and we charge \$30.55 a ton, which we consider a fair price for rails of that specification.

Q. How was that price arrived at? A. We tried to get a little more. We figured those rails ought to net us \$30.85 a ton, but it was just a question of merchandising, the seller getting the best price he could and the buyer the best he could, and we received \$30.55.

No Agreement with Foreign Rail Producers

Q. When Mr. Corey was on the stand, Judge Dickinson read to him the following from the minutes of the meeting of the Finance Committee of the United States Steel Corporation under date of November 1, 1904: "The president brought up the question of making some agreement with foreign producers in regard to the price of rails to be sold in neutral markets. After a full discussion the question was referred to Messrs. Gary and Corey with power." When did you first hear of that resolution? A. When it was introduced in evidence in this case. That is the first I ever heard of it.

Q. Did Mr. Gary or Mr. Corey ever speak to you about any such arrangement? A. No.

Q. Mr. Corey testified further that he received an impression from something that you had said to him, that some arrangement had been made by you with foreign rail manufacturers by which it was agreed or understood that they would not sell in this market. What is the fact? Did you ever say that to Mr. Corey? A. No. From time

to time I told him I did not think foreign manufacturers would sell rails in this country.

Q. Why did you feel that or have that impression? A. Because we had a capacity for production of 5,000,000 tons of rails a year in this country and a duty then of \$7.84 a ton and because of the natural idea that any large producer might have that if material was dumped into his market there would be reprisals and dumping in the other market.

Q. As a matter of fact, did you ever make any agreement or arrangement or have any understanding with foreign producers that they should not sell in this market? A. No.

Domestic Competition

At a request from Mr. Severance, Mr. Farrell named several of the largest competitors of the Steel Corporation. This testimony followed:

Q. What is your opinion as to whether or not the United States Steel Corporation could, without committing financial suicide itself, put these large manufacturers out of the steel business? A. It could not.

Q. Have you known or heard of a case where the Steel Corporation has sold at a less price in a particular market to drive out a competitor or has sought to obtain the custom of a competitor by secret rebates? A. No; not in a single instance, to my knowledge.

Q. What power to drive out a small competitor, if such power exists, by such means as I have just described in my last question, has the corporation other or greater than is possessed by any of the other large concerns which you have just mentioned? A. It has none.

Mr. Farrell then gave what he considered the advantage of having plants in widely separated parts of the country, because of deriving business from the zone each plant was in, and the same, he said, is true of the corporation's warehouses. These warehouses enable the corporation to dispose of more material, carry the stocks where requirements exist, and through that facility be able to make prompt shipments and get the business. In the one at San Francisco \$3,000,000 to \$4,000,000 worth of stock is held, and the turnover was more than 100,000 tons last year. The goods are moved via the Tehuantepec route, and 25,000 or 30,000 tons of material are afloat all the time in transit between the mills and the coast. The material afloat is frequently sold in transit by the corporation's agents who have a list of it.

A Story of Managing Efficiency

Mr. Severance brought out through skillful questioning certain policies of the Steel Corporation which had led to great economies in its operation. Mr. Farrell said:

The blast furnace committee consists of the superintendents of some of our blast furnaces, and meets once a month. This committee, for instance, studies by-product coke ovens and the resultant by-products. At the present time, I believe, we are conserving about 3,000,000 tons of coal by the use of by-product coke ovens. We burn some of the by-product tar as fuel and find that in some of our furnaces we are producing about 24 per cent. more steel using it as a fuel instead of producer gas, coal, or some other fuel. By using the by-product ovens at Gary we are able to use Pocahontas and some Illinois coal mixed. Before the by-product experiments were made, the Illinois coal was never regarded as coking coal. We are now using 25 per cent. of cheap Illinois coal.

As a result of the work of this committee in increasing furnace efficiency, 47 blast furnaces of the Carnegie Steel Company have for a considerable time produced more tonnage than was before produced by 51. This came from a study of ores and cokes and limestone, the proper flux, and the best results by these men, who go through the process of elimination to get down to the irreducible minimum as to what is the best thing.

We have an open-hearth committee, which consists of a number of selected superintendents of open-hearth plants, who make studies of the respective practices obtaining at various plants and compare notes. They are generally metallurgists. There are 24 of them and they meet in New York every two or three months. They study all new processes, and if some one comes to us and offers a process that is going to revolutionize the industry—at least most of the inventors think their processes will—this committee gives it careful investigation.

We also have committees studying the quality of rails and the steel going into them. They investigate all phases of steel quality through tests and analyses. There is a difference of opinion all the time between railroad managers and steel makers in reference to the chemical contents of rails. We feel that we can make a steel that will meet the requirements of the railroads under ordinary traffic conditions but we make rails according to the dif-

ferent specifications furnished, even though we may believe that our judgment is better than that of the railroads.

We have a bureau of investigation of new processes in charge of W. R. Walker, assistant to the president of the corporation, for taking up processes submitted by our own operating people and by others. We make many expensive experiments; for example, we have tried four or five types of by-product ovens, with a view of getting the best. We do that with all processes.

We have inaugurated many new uses for steel; for example, a new type of steel carwheel, steel sheet piling, steel fence posts, steel telegraph poles, concrete reinforcement, and various kinds of alloy steels for making tools of different kinds.

Wire Pools—Welfare Work—Gary Dinners

At Friday's hearing Mr. Farrell entered into an explanation of the custom of quoting finished iron and steel on a Pittsburgh price basis. He said that this had been a custom for many years. The Pittsburgh price, plus freight, makes the price to various points, being used even in figuring prices, for example, in Omaha on steel made in Chicago. This does not apply to pig iron. The Birmingham price, for instance, is the basing price for Southern pig iron. The Pittsburgh base does not hold so closely as it once did, because large steel centers are springing up in various localities, and each tries to make the best prices for the neighboring consuming industries. There are a considerable number of deviations from the Pittsburgh base. For example, the Colorado Fuel & Iron Company sells on a Pueblo base.

The Jackson Wire Pools

Mr. Severance examined Mr. Farrell about the so-called Jackson wire pools.

Q. In the testimony of certain witnesses for the Government there were references to certain pools in wire products of which a Mr. Jackson was what was called supervisor. Did you have any knowledge of the existence of those associations? A. There was a general knowledge in the trade that such associations existed.

Q. Did you know of them? A. I was told that there were such associations by customers and everybody else.

Q. Was the United States Steel Products Company a party to them? A. No.

Q. Was the Pittsburgh Wire Company a member in the old days when you were its manager? A. No.

Q. Did you ever have any conference with Mr. Jackson with reference to these wire pools? A. No.

Mr. Farrell told about certain correspondence with Frank Baackes, general manager of sales of the American Steel & Wire Company. He read a letter from Mr. Baackes dated January 22, 1908, asking that Mr. Farrell receive favorably a committee of manufacturers of weather-proof wire with the object that the price be maintained. Mr. Farrell then read his answer, which emphatically stated that the United States Steel Products Company would not have anything to do with any association, saying: "There is not any reason why we should receive deputations from associations which we know nothing about, and with which we have no connection. For obvious reasons it is preferable that we should have nothing to do with them, and that is the reason why we have not encouraged Supervisor Jackson and the delegation he desires to bring with him to discuss our policy."

Mr. Severance asked Mr. Farrell if he ever imparted any information concerning what he had learned about those pools or what he might have inferred about them, or say anything about them in any way, to Judge Gary or any of the executive officers of the Steel Corporation. The reply was, "I did not, on the ground that I did not consider it was our business."

Percentage of Corporation's Business Exported

Mr. Severance introduced as evidence an exhibit showing the percentage of business done by the Steel Corporation in its export and domestic trade. Mr. Farrell read parts of this exhibit, which, on the basis of tonnage shipped, was as follows: 1911, domestic, 82.4 per cent.; export, 17.6 per cent. 1912, domestic, 82.6 per cent.; export, 17.4 per cent. On the basis of selling value f.o.b. mill or plant, 1911, domestic, 84.5 per cent.; export, 15.5 per cent. 1912, domestic, 84.2 per cent.; export, 15.8 per cent.

Mr. Farrell next told about the corporation's cement industry, for utilizing blast furnace slag, with plants near Gary, Pittsburgh, and Chicago, and one building at Duluth. These plants produced last year 10,400,000 barrels. He then went quite exhaustively into details of extensions which the corporation had made to existing steel plants and the large sums spent in building the great works at Gary and the new plant at Duluth. Figures were given to show the huge expenditures constantly being made in the rehabilitation and modernizing of old plants. He said it has been the policy of the corporation to keep these plants in the best possible condition, with constant replacements, new machinery, and extensions, all with a view of increasing their general efficiency.

Stock Owned by Employees

The ownership of United States Steel stock by employees of the corporation was taken up. Mr. Farrell said that in October, 1911, there were about 22,000 or 23,000 employees owning stock, and on May 1, 1912, there were 23,786 registered holders, full paid, and 21,630 additional employees who are subscribers to the stock and are paying for it in instalments. A question by Judge Dickinson brought out the fact that Mr. Farrell was one of the employee subscribers to the corporation's stock and paying for it in instalments.

Under the plan offering stock to employees, they have subscribed to the extent of \$30,596,400 par value of the preferred stock and \$10,099,600 of the common stock, from 1903 to 1913 inclusive. In addition, under the special compensation part of the plan, the corporation has actually paid to subscribing employees \$5,728,604.61, and has credited them to be paid over future dates \$490,232.98.

Welfare Work of the Corporation

Mr. Farrell entered quite comprehensively into a description of the welfare work of the corporation, with which the readers of *The Iron Age* have been made quite familiar through articles published in these columns from time to time. He also gave details regarding the wide introduction of safety appliances by the several subsidiaries of the corporation, the pension and benefit systems, the voluntary accident relief plan and the steps which have been taken to secure the workmen at least one day of rest in every seven.

In line with what had previously been told regarding methods by which greater efficiency was secured, he gave a description of monthly meetings held by the sales managers of the various subsidiaries, the monthly meetings of credit managers and the frequent meetings of auditors who thus systematized their methods of accounting. He stated that the auditors figure the cost of manufacturing at one works, compare with another, and the result is a healthy rivalry among different superintendents and managers.

The Gary Dinners

Q. Did you attend some of the so-called Gary dinners? A. A few; not the first one. I was out of the country at the time.

Q. In the Government exhibit is given a portion of the record of a dinner given at the Waldorf-Astoria January 11, 1911. How long after your election as president of the United States Steel Corporation was this dinner? A. One day.

Q. This statement is taken from your remarks shown in the Government exhibit: "I understand the policy of the corporation to be to co-operate with its competitors in the effort to maintain fair prices and the stability of business conditions, by every means permissible under the laws of the country and not antagonistic to the public conscience." Was that statement of fact as you understood it at the time? A. Yes.

Q. Was that your own view? A. My own.

Q. Was there ever, as far as you know, or as far as you had in mind at that time, any agreement, express or implied, between the corporation and its competitors to maintain any specific prices on specific products? A. No.

Q. I will ask you further what you had in mind when you spoke of maintaining fair prices, and the stability of business conditions. A. I had in mind the necessity of keeping our heads at a time when a chaotic condition ex-

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The Steel Corporation's Defense

Five days of direct testimony by President Farrell reveal quite clearly the line to be followed by the Steel Corporation in defending itself against the Government's attack. In the main its defense is that neither what it has done regarding prices of its products nor the steps it has taken to strengthen its position should be penalized by dismemberment; that on the other hand it has done many things which have brought benefit to the steel trade, to its customers, to its employees and to the country. It may be recalled that much of the testimony brought out by the Government related to pools abandoned several years ago—some of them antedating the creation of the Steel Corporation and one actually abandoned before it was formed. This line of evidence was in support of the Government's contention that not only is the Steel Corporation in contravention of the Sherman act, but that some of its subsidiaries were formed in violation of it and should in turn be dissolved into their original units. So far as the defense has touched this phase of the case it has been satisfied with showing that the consolidations brought together in the Steel Corporation were not in competition. This is obviously true of the wire, the sheet, the tube, the bridge and the tin plate subsidiaries, but not so evident in the case of the Carnegie, the Federal Steel and the National Steel companies.

Of market prices in the past 12 years and the influences which have combined in their making, counsel for the Steel Corporation show that they may have much to add to what was developed in the Government's case and in the Stanley Committee hearings. In the final adjudication of the pending suit a clearer distinction may need to be drawn between potential competition and actual competition than has yet been applied to the situation existing under the co-operative movement, following the panic of 1907. It is already apparent that the defense will be as able to lay hold of price changes signifying that under the Steel Corporation régime there were reductions from the levels of preceding periods, as the Government was able to show that, comparing certain years with certain other years, there were advances after the Steel Corporation was formed. The exhibit of the defense showing that in some years on some articles export prices averaged higher than domestic prices bears directly on the claim of competitive conditions in the home market. In Germany, where the kartel system is in full flower, export prices are invariably below those in the domestic market.

That the Steel Corporation has not stifled competition, but in some lines produced in 1911 a considerably smaller percentage of the total than in 1901, is the argument of a mass of statistics President Farrell has produced. This is familiar ground so far as concerns pig iron and steel ingots, but it has not been fully appreciated what declines have taken place in the Steel Corporation's percentage of certain finished lines.

In telling of the corporation's betterment work and the improvements in practice it has steadily developed, Mr. Farrell answered one type of critic who has charged, but has never proved, that the American steel trade has not advanced as it would have done but for the consolidations. The criticism comes from that tribe of friends of American industry who are now arguing on one day that reductions in duties are needed to spur our manufacturers to higher efficiency and on

the next that our manufacturing economies have been so highly developed that we can get along without any protection.

Something too much has been said in recent months about the need that American manufacturers "match their wits" against those of manufacturers abroad. We were told in the campaign of 1912 that our manufacturers had neglected their opportunities and had been left behind in the race for world markets. Quite recently we have been promised from Washington a great unloading of our hobbled runners. One can but be impressed, in reading Mr. Farrell's recital on the stand, with the fact that some of our steel manufacturers, unmindful of the hobbles, have been setting a fast pace for nearly ten years. To have built up a foreign trade that in 1912 reached \$92,000,000 is an achievement which the bitterest opponent of the Steel Corporation must applaud. Only in a general way has even the steel trade been informed of this steady advance in markets that otherwise would have been practically in control of the steel makers of Europe. As now told it is an absorbing story of American enterprise. Whatever place the court gives it in the final sifting of the evidence, it will stand out as one of the most remarkable records in our recent industrial history.

"Direct Metal" in Steel Making

A welcome addition to the pig-iron statistics made in presenting the final official figures for 1912 is a statement of the form in which the iron was delivered, which shows how large a proportion of the output of Bessemer and basic iron is used directly in molten form for the production of steel. The figures for 1912, in gross tons, are as follows, as given in Bulletin No. 3 of the Bureau of Statistics of the American Iron and Steel Institute:

Molten	16,466,722
Sand cast	6,309,495
Machine cast	6,214,121
Chill cast	726,017
Direct castings.....	10,582
Total.....	29,726,937

A small proportion of molten iron is used in the direct casting of ingot molds, there being one detached enterprise of this sort, while some of the steel works follow this practice. A fair estimate of the molten iron used in the manufacture of steel, chiefly through the mixer, is 16,000,000 tons. The total production of Bessemer, low phosphorus and basic iron in 1912 was 23,081,901 tons, practically the entire quantity, or say 23,000,000 tons, being used for steel making. It is hardly necessary to deduct the tonnage used for molds, inasmuch as the molds when scrapped are usually consumed in steel making.

Thus approximately 70 per cent. of the total Bessemer and basic iron used in steel making is "direct metal." The remaining 30 per cent., of course, is not exclusively that used by detached steel works which purchase pig iron. At the regular steel works "Sunday metal" is cast, while sometimes small stocks are accumulated, and there are large steel interests which have detached furnaces. Thus while 70 per cent. of the total pig-iron consumption in steel making is direct metal, the steel plants which regularly employ the direct metal process probably make not far from 80 per cent. of the total steel manufactured. This represents a rapid growth in the process, the major part of the growth having been within the past decade, or at

least within the past dozen years. It is customary to compute the saving by the use of direct metal at more than a dollar a ton, \$1.25 being perhaps an average estimate, so that the American steel industry is now saving about \$20,000,000 a year by the use of this process. It is not surprising that the mixer litigation of a dozen years ago was so expensive, the number of pages of court records printed running well into four figures. Owing to the enormous tonnage it is conceivable that a sustained patent on the mixer would have proved more remunerative financially than would have been the most successful patent conceivable on the Bessemer process itself.

Having regard to the fact that no basic iron is sand cast, while nearly all the Bessemer iron produced is used direct, it is evident that only a small proportion of the total production of foundry grades of iron was chill cast. In 1899 a campaign of education was instituted, to induce foundrymen to use chill-cast rather than sand-cast iron. Obviously this campaign did not succeed.

Another interesting improvement in the 1912 pig-iron statistics is a statement of the fuel consumption. For the respective classes of pig iron the average consumption per ton was 2436.5 pounds of coke and raw bituminous coal, 565.2 pounds of anthracite plus 2341.6 pounds of coke, 2954.7 pounds of anthracite when used alone, and 102.1 bushels of charcoal. The production of pig iron as previously reported was divided as follows: Bituminous, 29,135,527 tons; anthracite and anthracite and coke, 244,585 tons; charcoal, 347,025 tons. Inasmuch as the total consumption of raw bituminous coal was only 47,022 net tons, used in making a portion of the more than 29,000,000 tons of "bituminous" pig iron, it is fairly accurate to say that the average consumption of coke in making coke pig iron in 1912 was about 2436 pounds per ton of pig iron. There are no statistics for past years with which to compare this factor, but it goes without saying that it is considerably larger than was the experience 15 years ago, due chiefly to the lower average iron content of the Lake Superior ores smelted. Probably there has not been much change in the past ten years, however, for statistics of limestone consumption have shown little variation since 1900, averaging a trifle under 1200 pounds per ton of pig iron, the 1912 consumption averaging 1137.2 pounds.

Shapes and Rods as Makers of Tonnage

Statistics of structural shape production are less significant than those of other rolled-steel products for the reason that the mill output has not corresponded closely with a specific line of consumption. The bulk of the product goes into fitted structural work, but the heavy structural work of to-day contains a much larger percentage of plates than was the case when the skeleton steel building was in its infancy. Again, the steel car uses considerable amounts of shapes and its coming in followed that of the skeleton steel structure by a decade or so. Finally, the earlier statistics did not separate light from heavy shapes. In 1910 and 1911 a partial division was made by separately stating such light forms as are used for bedstead angles, fence posts, windmills, etc., chiefly material rolled from old steel rails. The statistics for 1912, now presented by the Bureau of Statistics of the American Iron and Steel Institute, make a segregation which will probably prove entirely satisfactory to

the trade, inasmuch as it follows closely the commercial distinction, heavy shapes being sections with a 3-inch or greater dimension, all other being light shapes, such as are sold on the merchant steel bar card or purely on their own merits, like bedstead angles.

The total production of all structural shapes in 1912 was 2,846,487 tons, showing a gain of perhaps half a million tons over 1910, if the 1910 statistics had been so presented as to be strictly comparable. The tonnage did a little better than to double from 1902 to 1912, which is approximately in keeping with the growth of steel manufacture in general.

The rod statistics frequently show variations of their own. Thus the production in 1910 fell behind, when nearly everything else made a new record, while in 1911 a new record was made by a comfortable margin when in most products 1911 was an off year.

The 1912 production of iron and steel rods was 2,653,553 gross tons, against 2,450,453 tons in 1911, a record, and 2,335,685 tons in 1909, which year was record until 1911. One must go back to 1901 to find a rod production only half as large as that of 1912, while in 1892 production was one-fourth as large, so that there has been an average doubling in a decade.

A curious feature in the rod statistics is that from 10 to 20 years ago production grew much more rapidly than it has grown in late years. There was a record production in 1894, 673,402 tons, and production grew to 1,574,293 tons in 1902, a total increase of 133.8 per cent. in eight years, or at the average rate of 11.2 per cent. a year. To 1912 production grew to 2,653,553 tons, a gain of 68.6 per cent. in ten years, or only 5.4 per cent. a year on an average. It was strange that 1894, decidedly an off year, generally speaking, should see a new record made in rods, and likewise strange that tonnage should grow so greatly in immediately succeeding years. Some ten years or so ago predictions used to be made that eventually the rod tonnage would pass the rail tonnage. Rails have done their part toward bringing this to pass, as they have grown slowly, but rods have not done theirs.

Tariff Commission Idea Not Dropped

The advocates of a tariff commission have not been discouraged by the methods followed in the preparation of the new tariff bill. The National Tariff Commission Association, whose headquarters are in the Woolworth Building, New York City, is actively continuing its work of molding public opinion in support of a scientific method of tariff revision. Henry R. Towne, treasurer of the association, states that no one who intelligently comprehends the subject suggests that the pending tariff bill should be held up and action on it postponed until a tariff commission can be created and shall have reviewed the bill. He says that men of all parties and all interests unite in conceding that the downward revision of the tariff, decreed by the country at the election of 1912, should be accomplished as speedily as possible so that the uncertainty which now prevails may be terminated and that business may proceed to adjust itself to the new conditions. He adds that what is desired, however, by the great and increasing number of those who since 1909 have urged the creation of a permanent tariff commission is that, immediately following the passage of the pending tariff act, legislation shall be enacted creating a permanent governmental body to commence the work of compiling

and maintaining the fund of statistical and technical information which hereafter should be available to Congress when framing or amending tariff legislation.

The work which is being done by this association is commendable, and it is to be hoped that it will be effective in securing the legislation desired. We have no doubt that if the political complexion of the Administration had not been changed at the last national election we would now have a tariff board at work. Such changes as might be needed in our tariff would then have been made in the light of accurate and reliable information.

Canadian pig-iron production may reach the million-ton mark this year, as last year's production is now officially reported at 912,878 gross tons, involving a gain of 88,510 tons over the best previous year, and a repetition of this gain would bring the even million tons. The previous record was held by 1911, whereas in the United States 1911 was an off year. Canada has not had an off year since 1908 and in that year the dip was very slight.

More Orders for Steel Containing Copper

The Lake Shore Railroad last week ordered 1100 tons of tie plates at Chicago under specifications calling for 0.5 per cent. of copper. Allusion has already been made in these columns to the satisfactory service obtained by the Chicago, Milwaukee & St. Paul Railroad from the 5000 tons of rails with a small copper content purchased last year. A repeat order was placed two months ago for 8350 tons. The metallurgical department of the Illinois Steel Company has just started on a special laboratory study of the influence of a copper content on the physical properties of steel, with the expectation that more definite conclusions can be reached than have been possible thus far.

Pennsylvania Steel Company Improvements

Reference has been made to important improvements the Pennsylvania Steel Company has planned for some time for its Steelton, Pa., works, and for the Sparrows Point plant of the Maryland Steel Company. Among contracts already noted are those for 120 Koppers by-product coke ovens at Sparrows Point and for five Bethlehem gas blowing engines which will be installed in connection with the rebuilding of two of the four Maryland Steel Company blast furnaces. The Sparrows Point improvements will also include ultimately the building of a 24-in. structural mill and a bar mill, though these additions may not be made this year. At Steelton two 75-ton tilting open-hearth furnaces will be built as part of a new duplexing plant. This will include also a new Bessemer converter, a mixer and new blowing engines. At the open-hearth plant at Steelton a 75-ton stationary open-hearth furnace will be added. In ordinary operations the present Bessemer plant will no longer be used and some of the present open-hearth furnaces will stand idle, to be called upon only in times of unusual demand.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has largely increased its ore leases by taking over property on the Mesaba Range in Minnesota which will uncover fully 2,000,000 tons of ore. In addition, the company has ore holdings on the Menominee and Marquette ranges with 6,500,000 tons in sight. President James A. Campbell states that the company now has sufficient non-Bessemer ores to cover its needs for the next 40 years, but that it is still drilling to locate other deposits, being in need of more Bessemer ores.

The blast furnace of the Perry Iron Company, Erie, Pa., was blown out last week for relining and repairs. A new blowing engine will be installed.

Eastern Railroads Ask a New Rate Hearing

Formal application was made May 14 to the Interstate Commerce Commission by the Baltimore & Ohio, Pennsylvania, Erie and New York Central Lines for a reopening of the advanced rate cases of 1910. This appeal was made by counsel for the four roads in their own behalf and in favor of all other interstate carriers in what is known as official classification territory who desire and propose to increase all freight rates, class and commodity, on the basis of 5 per cent., with reasonable minimum per 100 lb. and per ton. These new rates would apply to all interstate shipments in the territory north of the Chesapeake & Ohio Railroad system and east of the Mississippi River.

In making their appeal for a rehearing, so as to enable the commission to determine whether the proposed 5 per cent. increase in Eastern freight rates is justified, the railroads assert their preparedness to expend vast sums for improvements, demanded by existing and future transportation conditions, and say that the money needed for these improvements must be largely provided through the issue of new securities, and that this capital cannot be obtained under existing transportation rates except on terms which would be prohibitive.

The commission promised to take up the subject at an early date, but gave no assurance that, even if the case were reopened, it would be able to conduct the necessary public hearings before the summer recess.

Luxemburg-Lorraine Production Growing

Our Berlin correspondent has made occasional references in his reports to the increasing production of iron and steel in the Luxemburg-Lorraine district of Germany. He now writes on this subject as follows:

The Burbach-Eich-Düdelingen combination, which has been mentioned in this correspondence at various times, will increase the production of pig iron there by about 1,800,000 tons a year; and it is predicted that this must cause a considerable reduction in the price of Luxemburg iron. It will get its new furnaces into operation next autumn.

The Thyssen establishment at Hagendingen began about a month ago to produce small sizes of bars, and another mill for turning out medium sizes will begin production within a few weeks. Both mills are of large capacity.

A number of the older mills there are also building additions to their plants; some are adding furnaces, some rolling mills. As the Gutehoffnungshütte has recently arranged with the railroad authorities to build a spur to its land near Diedenhofen, it is assumed that it will soon begin the erection of a large iron and steel plant. It is also looked upon as a certainty that the Krupp Company is planning a great establishment on its land acquired some time ago near Mazières.

The trade of that district is deeply interested in a project to build a canal along the Moselle River, which has been under discussion for about a decade, but which has apparently now entered upon a more hopeful future. The Alsace-Lorraine legislature has adopted a resolution in favor of building the canal to the Luxemburg frontier if Prussia refuses to do anything. It is hoped that Luxemburg will continue the canal through its territory to connect with a French project on its southwestern frontier, thus opening up for the Luxemburg-Lorraine district water communication with the North Sea by way of the French and Belgian systems. Belgium is also contemplating an extension of its canal system to a point near where the frontiers of the three countries join.

The Munning-Loeb Company, Matawan, N. J., has obtained the exclusive right for the manufacture and sale of the None-Such single and double cylinder rotating plating barrels which were patented by S. D. Catlin and formerly sold by Rockhill & Vietor. Several new features have been incorporated in the construction of these machines, which are now being manufactured at the plant of the Munning-Loeb Company. The company has also acquired the manufacturing and selling rights of the None-Such carboy rocker.

The Government Investigation of Industries

An interesting colloquy occurred between Congressmen Underwood and Mondel (Rep., Wyoming) in the House of Representatives May 15. Referring to the threatened investigations of industrial establishments by the Department of Commerce, Mr. Underwood said:

"There is no desire on the part of the Government to interfere with any industry. We have got no right to stop them, but when we see conditions in this country existing that will be detrimental to labor we are entitled to know one or two things. First, whether the manufacturers are telling the truth. If they are not telling the truth and intend to injuriously and unfairly punish their labor, taking an enactment of Congress as their excuse, then it is nothing but right that the fact should be given publicity. On the other hand, if a law on the statute books has in any particular instance been so drastic that it may affect the great industrial interests of this country and the wages of labor, whether you want to know it or not, this side of the House wants to know it, because we propose to do abstract justice, and if we have made a mistake we will not be afraid to recognize it."

"We do not intend to hide behind closed doors, but we are prepared to throw the limelight of public opinion, not only on the acts of the manufacturers, but on the acts of this House. If we have made a mistake we are men enough to acknowledge it and rectify it and if we have not we will see that other man does justice."

"Does not the gentleman think," asked Mr. Mondel, "that he will know by the investigation of the Department of Commerce if the industries of this country are seriously jeopardized or injured, and do I have his promise that if they are the injustice shall be rectified by legislation in the near future?"

"When the Department of Commerce reports," replied Mr. Underwood, "after a careful and honest investigation that an injustice has been done, either to an industry of this country or to the labor employed in that industry, you may rest assured that this side of the House will rectify any wrong that has been done."

American Iron and Steel Institute Meeting

The fourth general meeting of the American Iron and Steel Institute, which will be held at the Waldorf-Astoria, New York, Friday, May 23, promises to be the most largely attended the Institute has yet held. The membership has increased considerably since the Pittsburgh meeting and many of the new members will be present. About 350 persons have given notice of their attendance. Registration will begin at 9:30 a. m. and the first session will open at 10 o'clock. The list of papers represents a variety of subjects. In the paper by H. J. Freyn, Allis-Chalmers Company, results of recent gas-engine practice at blast furnaces and steel works will be given, the data including costs and other details of operations at the Gary plant of the Indiana Steel Company. There will be a session on Friday afternoon also, and on Friday evening the annual banquet will be held.

By-Product Ovens and Recovery Plant.—A handsome leather bound souvenir pamphlet has been published describing the by-product coke oven plant of the Birchenwood Colliery Company, Kidsgrove, North Staffordshire, England. The ovens are of the Carl Still type, and there are also Still installations for the production of lighting gas and for the extraction of various by-products, including sulphate of ammonia, benzole, crude and refined tar, heavy oils, and solvent and heavy naphthas. Views are given of the coke ovens, the ammonia house, the benzole house and other by-product departments. The booklet has been issued in commemoration of the visit of King George V and Queen Mary to the Birchenwood Collieries and connected works on April 23, 1913. The Carl Still engineering offices are at Recklinghausen, Germany, and the company is represented by Bagley, Mills & Co. in London and New York.

The punch and shear men of the steel department of the Mt. Vernon Car Company, Mt. Vernon, Ill., struck May 10, against a cut in wages and the suspension of the entire force is threatened by inability to settle the strike.

The Iron and Metal Markets

More Pig Iron Inquiry

Prices Lower, but Little Buying

Easier Market in Sheet Bars—Large Deals in Coke—Strikes Increasing

The situation this week is marked by a further decline in pig iron and in old material, and in the steel trade by the continuance of specifications at a rate 20 to 25 per cent. less than that of shipments, while new contracts are of comparatively small volume. In Chicago and the Central West the feeling is rather more cheerful, though without definite basis apart from the sentiment created by unusual crop promise. Whatever the possibility of even a small advance in railroad rates, it is not counted in the steel trade among the factors bearing on the early future.

Labor demands on consuming industries, particularly in the foundry trade, are more numerous. Buffalo and Los Angeles have been picked by the machinists' union for a test of strength, and in the former city a number of large plants have been closed down. Scarcity of labor is reported in a number of centers. Whatever recession there has been in general business has had little effect on consumption of iron and steel, though the melt of foundry iron is slightly less because of strikes.

Reports are not uniform as to the disappearance of premiums on early shipments of plates, shapes and bars. As mills are cutting down the accumulation of orders there are some surprises here and there at the deliveries now promised on new business. Early June shipments of bars have been offered at 1.40c., Pittsburgh, and plates can be had for delivery in 10 days at 1.50c., Pittsburgh. Some cutting on bar iron is reported in western districts.

Inquiry for structural steel is rather better than current business. Several contracts for railroad bridges are pending. In the past week a Pittsburgh fabricating company took 2800 tons for Bethlehem Steel Company works extensions. There were also awards of 2500 tons for a hotel at Grand Rapids, Mich., and 2000 tons for a factory building of the Tin Decorating Company at Baltimore. The United States Steel Products Company has booked 5000 tons of plates and shapes for the Canadian boat to be built at Port Arthur, Ont., by the Western Shipbuilding & Dry Dock Company.

The rail mills have had only moderate orders lately. The Kansas City Southern has bought 7000 tons of Bessemer rails at Chicago and another Western road 5000 tons. The Cuban Central has placed 5000 tons with the Tennessee company.

Reports of cutting in sheets are not fully borne out, but it appears that mills which were getting premiums in March and early April are now quoting below what are called regular prices. For third quarter No. 28 black sheets have sold at 2.35c., Pittsburgh, while on galvanized 3.40c. is common, and at Chicago, as well as Pittsburgh, the 3.35c. basis has been quoted on forward business.

Sheet bars are offered more freely and some mills are making little or no difference between prices for June and for third quarter delivery. A 25,000 ton sale of tin bars is reported, all for delivery before October 1, at \$27.50 Youngstown. A sale of 500 tons for early delivery was made at \$27 at maker's mill.

Pig-iron buyers are showing more interest in the market, but actual contracts are few, though sellers are looking for an early break in the deadlock. In a few cases deals have been made quietly, and presumably at

low prices. Southern iron has sold at \$11.50, Birmingham, for No. 2, or 25 cents less than in the previous week. Some export sales were made at \$11.50, Birmingham, for shipment to Italy and Austria, and lately some little business has sprung up with Rio Janeiro.

Some buyers have intimated that at \$11 they would be disposed to close for their requirements of Southern iron, and while predictions of that level have been made, the market has not been so seriously tested as to develop it. A sale of 1500 tons of No. 3 Southern iron was made at \$15.70 delivered at Philadelphia.

On relatively small sales Bessemer and basic iron have declined at Pittsburgh. The former has sold at \$16.60 Valley furnace, while basic iron has broken through \$15 at furnace. The foundry iron market at Pittsburgh and in northern Ohio has shown further weakness, No. 2 having been offered slightly below \$14.50 on a large contract, though some furnaces have taken a stand at that figure.

The coke market has been more active than in many weeks. A Pittsburgh interest about to start up two new furnaces has contracted for 1000 tons a day for shipment in the second half. Other furnace contracts are pending. Considerable contracts have been made in foundry coke at \$3.20 at ovens, and the largest buyer in the Chicago district has closed for 150,000 tons, much of it at \$3 and \$3.10 at ovens.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month, and one year previous.

	May 21,	May 14,	Apr. 23,	May 22,
Pig Iron, Per Gross Ton:	1913.	1913.	1913.	1912.
Foundry No. 2 X, Philadelphia...	\$16.75	\$16.75	\$17.25	\$15.25
Foundry No. 2, Valley furnace...	14.50	14.50	15.25	13.25
Foundry No. 2 S'th'n, Cin'ti...	14.75	15.00	15.25	14.25
Foundry No. 2, Birmingham, Ala...	11.50	11.75	12.00	11.00
Foundry No. 2, furnace, Chicago*	16.00	16.00	16.75	14.50
Basic, delivered, eastern Pa....	16.50	16.50	16.50	15.00
Basic, Valley furnace.....	15.00	15.35	15.75	13.00
Bessemer, Pittsburgh	17.50	17.90	17.90	15.15
Malleable Bessemer, Chicago**	16.00	16.00	16.75	14.50
Gray forge, Pittsburgh.....	15.00	15.40	15.65	13.90
Lake Superior charcoal, Chicago	18.00	18.00	18.00	17.75

Billets, etc. Per Gross Ton:

Bessemer billets, Pittsburgh,...	27.00	28.00	28.50	21.00
Open-hearth billets, Pittsburgh...	27.00	28.50	29.00	20.50
Forging billets, Pittsburgh.....	34.00	36.00	36.00	27.00
Open-hearth billets, Philadelphia	28.00	28.00	30.00	23.40
Wire rods, Pittsburgh	30.00	30.00	30.00	25.00

Old Material, Per Gross Ton:

Iron rails, Chicago.....	15.75	16.00	16.00	16.00
Iron rails, Philadelphia.....	18.00	18.00	18.00	16.50
Carwheels, Chicago	14.25	14.75	16.75	14.00
Carwheels, Philadelphia	13.50	13.50	14.50	13.50
Heavy steel scrap, Pittsburgh...	13.50	13.50	14.00	12.25
Heavy steel scrap, Chicago....	10.75	11.25	12.50	11.75
Heavy steel scrap, Philadelphia	12.00	12.00	13.00	13.50

Finished Iron and Steel

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.57 1/4	1.57 1/4	1.57 1/4	1.30
Iron bars, Pittsburgh	1.70	1.70	1.70	1.25
Iron bars, Chicago	1.57 1/4	1.57 1/4	1.57 1/4	1.25
Steel bars, Pittsburgh, future...	1.40	1.40	1.40	1.20
Steel bars, Pittsburgh, prompt...	1.70	1.70	1.85	1.20
Steel bars, New York, future...	1.56	1.56	1.56	1.36
Steel bars, New York, prompt...	1.86	1.86	2.01	1.36
Tank plates, Pittsburgh, future...	1.45	1.45	1.45	1.25
Tank plates, Pittsburgh, prompt...	1.60	1.60	1.70	1.25
Tank plates, New York, future...	1.61	1.61	1.61	1.36
Tank plates, New York, prompt...	1.76	1.76	1.76	1.36
Beams, Pittsburgh, future.....	1.45	1.45	1.45	1.25
Beams, Pittsburgh, prompt.....	1.50	1.50	1.70	1.25
Beams, New York, future	1.61	1.61	1.61	1.36
Beams, New York, prompt....	1.66	1.66	1.71	1.36
Angles, Pittsburgh, future....	1.45	1.45	1.45	1.25
Angles, Pittsburgh, prompt....	1.50	1.50	1.70	1.25
Angles, New York, future....	1.61	1.61	1.61	1.36
Angles, New York, prompt....	1.66	1.66	1.71	1.36
Skelp, grooved steel, Pittsburgh	1.45	1.45	1.45	1.15
Skelp, sheared steel, Pittsburgh	1.50	1.50	1.50	1.20
Steel hoops, Pittsburgh	1.60	1.60	1.60	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	May 21, May 14, Apr. 23, May 22,			
	1913.	1913.	1913.	1912.
Sheets, Nails and Wire,	Cents.	Cents.	Cents.	Cents.
Per Pound to Large Buyers:				
Sheets, black, No. 28, Pittsburgh	2.30	2.30	2.35	1.90
Wire nails, Pittsburgh	1.80	1.80	1.80	1.60
Cat nails, f.o.b. Eastern mills	1.80	1.80	1.80	1.55
Cat nails, Pittsburgh	1.70	1.70	1.70	1.55
Fence wire, ann'td., 0 to 9, Pgh.	1.60	1.60	1.60	1.40
Bath wire, galv., Pittsburgh	2.20	2.20	2.20	1.90

Coke, Connellsburg, Per Net Ton, at Oven:

	May 21, May 14, Apr. 23, May 22,	Plain Wire, per 100 lb.							
	Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	...\$1.75	\$1.80	\$1.85	\$1.90	\$2.00	\$2.10	\$2.20	\$2.30	\$2.30
Galvanized	2.15	2.20	2.25	2.30	2.40	2.50	2.60	2.70	3.00

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight) in effect from April 12, 1913, iron pipe (full weight), from October 21, 1912:

	Butt Weld.			
	Steel.	Iron.	Black.	Galv.
16, 14 and 12	72½	52	56	48
12	76½	66	48	47
9 to 3	79½	71	57	57
			73	62

Lap Weld.

	2	2½ to 6	7 to 12	13 to 15	1½ to 4	4½ to 6	7 to 12
	76½	68	1½	..	57	46	
	78½	70	1½	..	68	57	
	75½	65	2	..	69	59	
	52½	..	..	..	71	62	
					71	62	
					69	56	

Plugged and Reamed.

	1 to 3, butt.	2	2½ to 4, lap.	3 to 12	1 to 1½, butt.	2	2½ to 4, lap.
	77½	69	74½	66	72	72	61
	74½	68	76½	68	75	66	44
	76½	..	78½	70	71	68	55
					71	62	57
					67	67	60
					69	69	60

Butt Weld, extra strong, plain ends.

	36, 1½ and ¾	57	3½	64	53
	67½	57	56	68	61
	72½	66	56	72	63
	76½	70	56	72	63

	2 to 3	77½	71	2 and 2½	73	64

Lap Weld, extra strong, plain ends.

	36	62½	56	56	58	50
	65½	59	56	61	53	
	67½	61	2 and 2½	63	55	

	2	2½ to 4	4½ to 6	7 to 8	2	2½ to 4	4½ to 6	7 to 8
	73½	65	57	57	66	67	59	
	75½	67	59	59	71	71	62	
	74½	66	57	57	70	70	61	
	67½	57	4½ to 6	4½ to 6	63	64	54	
	62½	52	7 and 8	7 and 8	64	64	54	
					59	59	48	

	2	2½ to 4	4½ to 6	7 to 8	2	2½ to 4	4½ to 6	7 to 8
	63½	57	59	59	66	67	59	
	65½	59	58	58	61	62	54	
	64½	58	4½ to 6	4½ to 6	60	60	54	
	57½	47	7 to 8	7 to 8	53	53	43	

Butt Weld, double extra strong, plain ends.

	36	62½	56	56	58	50
	65½	59	56	61	53	
	67½	61	2 and 2½	63	55	

	2	2½ to 4	4½ to 6	7 to 8	2	2½ to 4	4½ to 6	7 to 8
	63½	57	59	59	66	67	59	
	75½	67	59	59	71	71	62	
	74½	66	57	57	70	70	61	
	67½	57	4½ to 6	4½ to 6	60	60	54	
	62½	52	7 and 8	7 and 8	64	64	54	
					59	59	48	

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from February 1, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

	Lap-Welded Steel.	Standard Charcoal Iron.	
1½ and 2 in.	60	1½ in.	44
2½ in.	57	1½ and 2 in.	48
2½ and 3½ in.	63	2½ in.	44
3 and 3½ in.	68	2½ and 3½ in.	53
3½ to 4½ in.	70	3 and 3½ in.	55
5 and 6 in.	63	3½ to 4½ in.	58
7 to 13 in.	60	Locomotive and steamship special grades bring higher prices.	

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2½ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Nos. 3 to 8	Nos. 9 and 10	Nos. 11 and 12	Nos. 13 and 14	Nos. 15 and 16	Cents per lb.
	1.70
	1.75
	1.80
	1.85
	1.95

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11	1.95 to 2.00
No. 12	1.95 to 2.00
Nos. 13 and 14	2.00 to 2.05
Nos. 15 and 16	2.05 to 2.10
Nos. 17 to 21	2.10 to 2.15
Nos. 22 and 24	2.15 to 2.20
No. 25 and 26	2.20 to 2.25
No. 27	2.25 to 2.30
No. 28	2.30 to 2.35
No. 29	2.35 to 2.40
No. 30	2.45 to 2.50

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, \$30. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.60; galvanized, \$2. Galvanized barb wire, to jobbers, \$2.20; painted, \$1.80. Wire nails, to jobbers, \$1.80.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Galvanized Sheets of Black Sheet Gauge.

	Cents per lb.
Nos. 10 and 11	2.40 to 2.50
No. 12	2.50 to 2.60
Nos. 13 and 14	2.50 to 2.60
Nos. 15 and 16	2.65 to 2.75
Nos. 17 to 21	2.80 to 2.90
Nos. 22 and 24	2.95 to 3.05
Nos. 25 and 26	3.10 to 3.20
No. 27	3.25 to 3.35
No. 28	3.40 to 3.50
No. 29	3.55 to 3.65
No. 30	3.70 to 3.80

Pittsburgh

PITTSBURGH, PA., May 20, 1913.

One leading steel interest reports its specifications last week 82 per cent. of shipments; another that its shipments were about 50,000 tons and its specifications 5000 tons less. A conservative estimate is that shipments from all mills are now about 20 per cent. in excess of specifications. As the larger steel companies have actual orders on their books for at least three months ahead, and the leading interest for a longer period, it would take at least three months to clean up if no new business was taken in the meantime. The general belief is that if prices are to settle down to a lower basis than is now ruling this will be reached by July 1, or not later than August 1, and a new buying movement is looked for early in the second half. Prices of steel bars are firm at 1.40c. and plates and shapes at 1.45c., but in sheets further weakness has developed. Tin plate specifications have fallen off and pipe is quiet. The wire trade is dull. The pig-iron market is weak, with lower prices certain before any large new business can be closed. Offering of billets and sheet bars by the smaller steel companies are more frequent, and prices are fully \$1 a ton lower. Coke is fairly steady at \$2.15 to \$2.20 at oven for prompt furnace. Several large inquiries for first half are out and a steel company with a new furnace plant is reported to have closed for about 1000 tons per day, shipments to start about June 10 to 15. Scrap is still dragging. There is some unrest among labor, and three or four local plants have recently had strikes that have crippled their operations.

Pig Iron.—Declines in prices of both basic and Bessemer iron have taken place on relatively small sales. We note a sale of 1000 tons of Bessemer for delivery outside the Pittsburgh district on the basis of \$16.60 at Valley furnace. The American Steel Foundries has bought 1000 tons of basic iron for prompt delivery to its Sharon works and 2000 tons for its Alliance works from a Valley furnace at not above \$15 at furnace, and it is intimated that the price was under that figure. It is known that three or four local consumers of basic will need iron for June shipment, but as yet they have not come in the market. The Westinghouse Electric & Mfg. Company has not yet closed on its large inquiry for last-half delivery. A number of producers made a price equal to \$14.50, Valley furnace, for No. 2, and one or two named close to \$14.25, but those who named the lower price are not able to furnish all the iron, and the placing of the contract has been held up to see if \$14.50 cannot be shaded on all the iron. Small sales of No. 2 foundry are being made at \$14.75 for standard grades. Malleable Bessemer has sold at \$14.75 at furnace. Gray forge is weaker and is offered as low as \$14. at furnace. We quote Bessemer iron at \$16.60; basic, \$15; malleable Bessemer, \$14.75; No. 2 foundry, \$14.50; gray forge, \$14 to \$14.25, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

Billets and Sheet Bars.—Premiums for prompt delivery have disappeared. The large makers of steel are as hard pressed for deliveries by their customers at present as at any time for some months, but the smaller makers are offering steel more freely and are making practically no differential in price on May and June steel as compared with third quarter. A local tin plate company bought recently from a Youngstown mill 25,000 tons of tin bars, all for delivery prior to October 1, at \$27.50 maker's mill, the freight rate being \$1 a ton to consumer's mill. This sale, with others it has made, has practically taken up that mill's entire supply for the open market for third quarter. We also note a sale of 500 tons of sheet bars for reasonably prompt delivery at about \$27 at maker's mill. For reasonably prompt and third-quarter delivery we now quote as follows: Bessemer and open-hearth billets, \$26.50 to \$27; Bessemer and open-hearth sheet bars, \$27 to \$27.50; all at maker's mill, Pittsburgh or Youngstown. Some makers of steel are refusing to meet these prices, but they are

being named by fairly large producers. Forging billets have also eased off, and we quote these at \$34 to \$35 and axle billets \$33 to \$34, Pittsburgh.

Ferroalloys.—An occasional carload of ferromanganese is sold for prompt delivery, the regular price of \$61, Baltimore, being shaded 50c. to \$1 a ton. We therefore quote 80 per cent. English ferromanganese at \$60 to \$60.50, Baltimore, the freight rate to the Pittsburgh district being \$2.16 per ton. We note sales of several carloads of 50 per cent. ferrosilicon for prompt delivery at the full price. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$75; over 100 tons to 600 tons, \$74; over 600 tons, \$73, Pittsburgh. We quote 10 per cent. at \$24; 11 per cent., \$25; 12 per cent., \$26, f.o.b. cars at furnace, Jackson, Ohio, or Ashland, Ky. We quote ferro-carbon-titanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, 12½c. in lots up to 2000 lbs.

Wire Rods.—The new demand is quiet and specifications against contracts are not coming in so freely. We quote Bessemer, open-hearth and chain rods nominally at \$30, Pittsburgh.

Muck Bar.—The market is dull and prices are lower. We quote best grades made from all pig iron at \$29.50 to \$30, Pittsburgh, with standard makes of Eastern bar offered in this market at about \$2 per ton less.

Skelp.—One or two of the mills that roll skelp are in position to take some business for reasonably prompt shipment. A sale is reported of about 1000 tons of grooved steel skelp at a shade under 1.45c., Pittsburgh. We quote: Grooved skelp, 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.75c. to 1.80c.; sheared iron skelp, 1.85c. to 1.90c., delivered at buyers' mill in the Pittsburgh district.

Steel Rails.—In standard sections orders for only small lots, ranging from 100 tons up to 500 tons, are now being given out. The expected business from traction companies has not developed. The new demand for light rails has fallen off. The Carnegie Steel Company received new orders and specifications in the past week for light rails for about 2500 tons. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Structural Material.—Inquiry is lighter and little new business is being placed. The American Bridge Company has taken 700 to 800 tons of structural steel for transmission towers for the Alabama Power Company and the Jones & Laughlin Steel Company has received a contract for 400 tons of steel for the Western Union Telegraph Company at Detroit, Mich. The McClintic-Marshall Construction Company has the contract for 2800 tons for extensions to the works of the Bethlehem Steel Company, South Bethlehem, Pa. Extensions to the Boggs & Buhl store, Pittsburgh, requiring close to 2000 tons, are expected to be placed this week. The two or three large hotel projects talked about in this city are slow in developing. We quote beams and channels up to 15 in. at 1.45c. to 1.50c. Small lots from warehouse for prompt delivery are bringing from 1.60c. up, depending on the size of the order and the deliveries wanted.

Plates.—The steel car companies are now catching up on deliveries, partly because no large car orders have recently been placed and partly because deliveries of plates and shapes by the mills are better. The Hocking Valley is expected to buy 1000 steel hoppers in the near future. We quote ¼ in. and heavier tank plate at 1.45c., Pittsburgh, for delivery at convenience of the mills, but for shipment in two to three weeks Eastern mills are naming 1.50c. to 1.60c. on plates delivered in the Pittsburgh district.

Iron and Steel Bars.—The new demand for steel bars is quieter and specifications show a falling off. Consumers display a strong disposition not to take bars any faster than actually needed to meet their wants. However, leading makers of steel bars have actual orders on their books sufficient to cover their entire output for the next two to three months or longer. The new demand for iron bars is lighter, but the mills are comfortably filled with orders for 60 days or longer. A continued heavy demand is experienced for hard steel bars for reinforcing purposes, and mills rolling this product are filled up for four or five months. We quote merchant steel bars at 1.40c. to 1.45c. for delivery at convenience of the mill, which would not be before third quarter, while for shipment from warehouses 1.90c. to 2c. is quoted. We quote iron bars at 1.70c. to 1.75c. for reasonably prompt delivery. Mills charge \$1 extra per ton for twisting ¾ in. and larger steel bars and \$2 extra for ½ to 5/8 in.

Sheets.—Exaggerated rumors are in circulation of serious cutting in prices of sheets. The easing off in prices of sheet bars for third quarter and the starting up of some new sheet-making capacity have brought about a decline in black sheets of \$1 to \$2 a ton and on galvanized of about \$2 a ton. It is a curious fact that the steel mills that six or eight weeks ago were getting premiums for prompt deliveries are now cutting what are regarded as the regular prices. One interest that is building a sheet mill that will not be active before July is offering galvanized sheets for third quarter on the basis of 3.35c., Pittsburgh. On Thursday and Friday of last week, the American Sheet & Tin Plate Company had 16 of the 37 hot sheet mills in its Vandergrift works idle for lack of steel. It is operating this week to about 79 per cent. of its hot sheet mill capacity and is still seriously inconvenienced in its supply of steel. We note a sale of 1000 tons of No. 28 black open-hearth steel sheets for last-half delivery on the basis of 2.35c., Pittsburgh. No guarantee as to prices was given on this contract, but if the company that made the sale should reduce its price before the contract is completed it will allow such reduction on any unshipped portion of the order. Prices on blue annealed sheets are absolutely firm. We quote No. 10 blue annealed sheets at 1.75c.; No. 28 Bessemer black sheets, 2.30c. to 2.35c.; No. 28 galvanized at 3.40c. to 3.50c., and No. 28 tin mill black plate at 2.30c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Carwheels.—The Carnegie Steel Company sold 500 steel carwheels to the Pullman Company and is operating its Schoen steel wheel works at McKees Rocks to full capacity, with orders ahead for several months.

Tin Plate.—Specifications against contracts are not so heavy, but leading makers have all they can do in the next three or four months in filling orders booked. It is still believed there will be a shortage in supply of certain sizes on which specifications have been particularly large. It is claimed on the other hand that some of the leading can companies carried over heavy stocks of cans from last year. The American Sheet & Tin Plate Company is operating this week to about 90 per cent. of its hot tin mill capacity, but other makers that are able to get a full supply of steel are operating to 100 per cent. We quote 100 lb. cokes at \$3.60; 100 lb. ternes at \$3.45 and No. 28 black plate at \$2.30, all f.o.b. Pittsburgh.

Hoops and Bands.—One leading maker of hoops and bands states that he has orders on his books for his entire output for the next five months. Specifications against contracts for hoops are heavy but for bands are only fair. The new demand is lighter as most consumers are covered for some time ahead. We quote bands 1.40c., with extras as per the steel bar card and hoops at 1.60c., f.o.b. Pittsburgh.

Bolts and Rivets.—Specifications against contracts for both bolts and rivets are fairly active, but the new demand is quiet. Some makers state they are adhering rigidly to regular prices, but others that are not so well filled up are shading. On new business the market on bolts is about 5 per cent. less than what are regarded as the regular discounts. Button-head structural rivets are about \$2.10 and cone-head boiler rivets about \$2.20. Regular discounts on bolts are as follows, in lots of 300 lb. or over delivered within a 20c. freight radius of maker's works:

Coach and lag screws	.80 and 10% off
Small carriage bolts, cut threads	.75 and 5% off
Small carriage bolts, rolled threads	.75 and 10% off
Large carriage bolts	.70% off
Small machine bolts, cut threads	.75 and 10% off
Small machine bolts, rolled threads	.75, 10 and 5% off
Large machine bolts	.70 and 7% off
Machine bolts with C.P.C. and T nuts, small	.75 and 5% off
Machine bolts with C.P.C. and T nuts, large	.70% off
Square hot pressed nuts, blanked and tapped	\$5.70 off list
Hexagon nuts	\$6.30 off list
C.P.C. and R. square nuts, tapped and blank	\$5.70 off list
Hexagon nuts, 5/8 and larger	\$6.60 off list
Hexagon nuts smaller than 5/8	\$7.20 off list
C.P. plain square nuts	\$5.20 off list
C.P. plain hexagon nuts	\$5.50 off list
Semi-finished hexagon nuts 5/8 and larger	.85% off
Semi-finished hex. nuts smaller than 5/8	.85 and 10% off
Rivets, 7/16 x 6 1/2, smaller and shorter	.75, 10 and 10% off
Rivets, metallic tinned, bulk	.35c. per lb. net extra
Rivets, tin plated, bulk	.15c. per lb. net extra
Rivets, metallic tinned, packages	.70, 10 and 10% off

Wire Products.—The new demand for wire and wire nails is quiet. Specifications against contracts, while fair, are not so heavy as expected at this season, which is usually active in the wire trade. On new business, regular prices to jobbers in carload and larger lots, but which are not being strictly maintained, are as

follows: Wire nails, \$1.80, base, per keg; cut nails, \$1.70 to \$1.75; galvanized barb wire, \$2.20 per 100 lb.; painted, \$1.80; annealed fence wire, \$1.60, and galvanized fence wire, \$2, f.o.b. Pittsburgh, usual terms, freight added to point of delivery. Jobbers charge the usual advances over these prices for small lots from store.

Railroad Spikes.—Specifications against contracts have lightened materially and the new demand is not so active. Spike makers look for some new business in June, stating that all the railroads have not yet covered for their supply of spikes for last half. Prices are only fairly strong. We quote railroad spikes in base sizes, 5 1/2 by 9/16 in., at \$1.80, and small railroad and boat spikes in carload lots at \$1.85 to \$1.90 per 100 lb. f.o.b. Pittsburgh.

Shafting.—The new demand is quiet and specifications are smaller. Some of the automobile builders have covered for their supply for last half, but much of this business still remains to be closed. The Ford Motor Company, Detroit, Mich., is expected to close for 3000 to 4000 tons for next year's delivery within a short time. We quote cold-rolled shafting at 58 per cent. off in carload lots, and 53 per cent. in small lots delivered in base territory, the usual slight differential over these discounts being allowed to the large consumers.

Merchant Steel.—The mills are catching up on deliveries to some extent, as the new demand is quiet and specifications have fallen off. One leading maker states that it has enough orders on its books to take its entire output for the next three months. Prices are only fairly strong, but as yet are not actually lower. We quote: Iron finished tire, 1 1/2 x 1/2 in. and larger, 1.40c. to 1.55c., base; under 1 1/2 x 1/2 in., 1.55c. to 1.65c.; planished tire, 1.60c. to 1.70c.; channel tire, 3/4 to 7/8 and 1 in., 1.90c. to 2c.; 1 1/8 in. and larger, 1.80c. to 1.90c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.50c. to 1.65c.; concave and convex, 1.80. to 1.90c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.80c. to 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1 1/2 in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Merchant Pipe.—Lap weld pipe is in fairly active demand but butt weld sizes are quiet. The Hope Engineering Company of this city is reported to be in the market for 30 to 40 miles of 8, 10 and 12-in. Specifications against contracts are not as active as they were. As a whole, new business entered so far this month is less than in the same period in April. Shipments by all the pipe mills are now in excess of specifications. Discounts on iron and steel merchant pipe are being slightly shaded.

Boiler Tubes.—The demand for boiler tubes is enormously heavy, and some mills that are far back in deliveries have advised customers to cancel orders and place them with others that can make quicker deliveries. One mill reports that it is five months back in deliveries and has practically no more boiler tubes to sell for this year. The demand for seamless tubing is also heavy, and the mills are sold up for months ahead. Discounts on locomotive and merchant tubes are being fairly well observed.

Coke.—It is reported that the Pittsburgh Steel Company has closed with a prominent Connellsville coke operator for its entire requirements of furnace coke for this year, being about 1000 tons per day. It expects to start one furnace about June 15 and the other about a month later. The company has been negotiating for its coke for some time and is said to have made an offer of \$2 per net ton at oven for its entire supply for 10 years, which was refused by the coke producers to whom it was submitted. The contract for the present supply is said to have been placed at about \$2.25 per net ton at oven. The International Harvester Company has contracted with local coke interests for its entire supply of foundry coke, about 150,000 tons, for the year commencing July 1, and it is stated the price was \$3 to \$3.20 per net ton at oven. The producers taking these contracts make a high grade foundry coke which usually commands a premium. The New Jersey Zinc Company is inquiring for 10,000 tons per month for last half for its two blast furnaces in the Lehigh Valley, and Wickwire Brothers are also asking prices on 800 tons of furnace coke per day for its furnaces at Buffalo. There is still considerable trouble with labor in the coke regions and a number of plants are short of men. We note sales of 40 cars or about 1200 tons of furnace coke for May

delivery at \$2.20 at oven. Some contracts for foundry coke for delivery over last half have been made at about \$3 at oven. We quote standard grades of prompt furnace coke at \$2.15 to \$2.25 at oven, and while \$2.50 is talked of for the last half of the year it is probable that on a firm offer some would sell at \$2.25. We quote standard makes of foundry coke for last half at \$3 at oven and one maker is said to be holding at \$3.20. The Connellsville Courier gives the output of coke in the Upper and Lower Connellsville regions last week at 403,069 tons, an increase over the previous week of about 11,000 tons.

Old Material.—There is no improvement in the local scrap market either as regards new demand or prices, but on the contrary some grades of scrap have sold at a still lower figure. The market on bundled sheet scrap, sheet bar crop ends and machine shop turnings is particularly weak. A sale of 1500 tons of selected heavy steel scrap was made to a local consumer last week at \$13.75, delivered. Dealers are now quoting as follows, per gross ton, for delivery in the Pittsburgh and nearby districts:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	\$13.50 to \$13.75
No. 1 foundry cast	13.75 to 14.00
No. 2 foundry cast	12.75 to 13.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.,	15.00 to 15.25
No. 1 railroad malleable stock	12.75 to 13.00
Grate bars	10.00 to 10.25
Low phosphorus melting stock	16.00 to 16.25
Iron car axles	25.50 to 26.00
Steel car axles	19.00 to 19.50
Locomotive axles, steel	23.00 to 24.00
Locomotive axles, iron	27.00 to 27.25
No. 1 busheling scrap	13.00 to 13.25
No. 2 busheling scrap	9.00 to 9.25
Old carwheels	14.25 to 14.50
*Machine shop turnings	7.75 to 8.00
*Cast-iron borings	9.25 to 9.50
†Sheet bar crop ends	15.25 to 15.50
Old iron rails	15.50 to 15.75
No. 1 railroad wrought scrap	14.25 to 14.50
Heavy steel axle turnings	10.50 to 10.75
Stove plate	9.50 to 9.75

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Chicago

CHICAGO, ILL., May 21, 1913.—(By Telegraph.)

The past week the favorable aspects of the general situation appear to have exercised a predominating influence on market sentiment. The exceptionally promising crop outlook is coming to have an increasing importance in molding opinion regarding business prospects. A somewhat better and less severely conservative tone prevails in banking circles. Tangible evidences from which considerable optimism has been drawn are found in an appreciable increase in specifications. Purchases of rails aggregating 12,000 tons are noted and track supply orders included 1100 tons of special tie plates. Steel bar specifications and new contracts ran heavier in tonnage than for several weeks, but undue significance ought not to attach to the record of one week as there is no normal reason for anticipating any marked increase in activity at this time. It still remains true that mill shipments are exceeding bookings and deliveries are becoming easier very gradually. This is desirable and is the occasion for some of the increased mill business which can now be placed with the expectation of reasonably good delivery. The warehouse business shows practically no let-up. Buyers, however, are undoubtedly proceeding on the assumption that everything is to be gained and nothing lost by limiting their purchases to the minimum. With respect to pig iron, developments of the week have not been of a conclusive character. A few sales of importance have been made, more probably than have come to common knowledge, and all attended by the keenest competition. But with a large volume of inquiry pending, the course of the market remains in doubt. Scrap prices are lower than a week ago.

Pig Iron.—Pig-iron sales of the past week have been confined almost entirely to Northern iron, and of that the bulk has been either malleable or basic iron rather than for gray iron work. A number of contracts for castings have been closed, and the iron to cover has been quietly purchased, which tonnage has contributed to a rather heavier movement than has appeared on the surface. The most conspicuous sales

of the week in which the local producers were involved were made for St. Louis consumption, 3000 tons of basic and 1000 tons of malleable having been placed. Concerning the prices made, there is little doubt that they offer incentive to every prospective buyer to profit as much as possible from the palpable weakness of the market and from the keenness of competition for whatever business is offered. Under such circumstances any quotation is to an extent nominal and is limited to a narrower range of prices than keenly competitive selling will develop. For Southern iron \$12, Birmingham, is still the quotation upon such small lots as are in this market, but this price is apparently not the bottom of the market should a desirable tonnage appear. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4,	\$18.00 to \$18.50
Northern coke foundry, No. 1	16.75 to 17.25
Northern coke foundry, No. 2	16.00 to 16.75
Northern coke foundry, No. 3	15.50 to 16.00
Southern coke, No. 1 foundry and No. 1 soft	16.85
Southern coke, No. 2 foundry and No. 2 soft	16.35
Southern coke, No. 3	15.85
Southern coke, No. 4	15.85
Southern gray forge	15.85
Southern mottled	15.85
Malleable Bessemer	16.00 to 16.50
Standard Bessemer	19.40 to 19.50
Basic	16.00 to 16.50
Jackson Co. and Kentucky silvery, 6 per cent	20.40
Jackson Co. and Kentucky silvery, 8 per cent	21.40
Jackson Co. and Kentucky silvery, 10 per cent	22.40

(By Mail)

Rails and Track Supplies.—Rail purchases the past week were of a miscellaneous character, aggregating about 12,000 tons, placed with local mills. An interesting feature of the week's business was the ordering of 1100 tons of tie plates by the Lake Shore Railroad, the specifications for which called for the inclusion of 0.5 per cent. copper. We quote standard railroad spikes at 1.90c. to 2c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, \$35 to \$35 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Structural lettings reported for the week were light. The Minneapolis Steel & Machinery Company will fabricate 600 tons for a coal-handling bridge for the Minnesota Steel Company at Duluth and 300 tons for a building for the Twin City Cold Storage Company at Minneapolis. The Milwaukee Bridge Company took the contract for 385 tons for a viaduct at Peoria, Ill., for the Chicago, Rock Island & Pacific Railroad and the Wisconsin Bridge & Iron Company 330 tons of bridge work for the Missouri, Kansas & Texas. A transmission line for the Wisconsin River Power Company will take 456 tons, to be supplied by the American Bridge Company. The Western Iron Works will furnish 700 tons for the Thompson Building at Oakland, Cal. Other contracts were small. Mill orders for structural shapes continue light, and occasional instances are now noted where mills can accommodate orders for certain sizes for fairly prompt delivery. We continue to quote for Chicago shipment, mill delivery, 1.63c. to 1.68c.

From store the call for structural materials is in marked contrast to the volume of new mill business and this department is one of the most active. While the somewhat easier mill conditions have diverted the larger tonnage orders away from the jobbers back into their normal channels, the present activity reflects a large aggregate of small orders current. We quote for delivery at Chicago from warehouse, 2.05c.

Plates.—Premium prices have practically disappeared and the number of mills able to furnish plates for reasonably early delivery is gradually increasing. Specifications the past week were more liberal and materialized at a better rate than for several weeks. Railroad buying of cars and locomotives is still a factor. We quote for Chicago delivery, from mill, 1.63c. to 1.68c.

Warehouse shipments of plates continue light, with prices unchanged on the basis of 2.05c. for Chicago delivery.

Sheets.—An easier situation is developing with most of the sheet mills and new business is finding a large number of mills in a position to quote. For black sheets prices are being maintained with considerable firmness, and the rapidly growing demand for blue annealed sheets for many new uses offers a substantial foundation for this line of material. The weaknesses in galvanized sheet quotations have not disappeared, and prices based on 3.40c., Pittsburgh, are general while some of the larger jobbers are credited with obtaining

even more pronounced concessions. The leading interest, on the contrary, appears to be holding to full prices without variation. We continue to quote for Chicago delivery in carloads from mill: No. 28 black sheets, 25c.; No. 28 galvanized, 3.58c. to 3.68c.; No. 10 blue annealed, 1.93c.

The demand for sheets out of store is only fair, but practically no irregularities in price have appeared. We quote without change as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.90c.; No. 28 galvanized, 4.15c.

Bars.—Makers of steel bars report the receipt of some additional implement contracts, together with an improved volume of specifications. There has been less recession in steel bar tonnage than in any other of the finished steel products. New bar iron offerings were scattering and shipments are exceeding bookings by quite a margin. Most of the Western mills have specifications booked that will take their capacity until July 1, and the protection of this business will militate against any concessions in price, even if the present lack of new orders should continue. We quote for mill shipment as follows: Bar iron, 1.57½c. to 1.62½c.; soft steel bars, 1.58c. to 1.65c.; hard steel bars, 1.60c. to 1.70c.; shafting in carloads, 58 per cent. off; less than carloads, 33 per cent. off.

Bar shipments from warehouse are still leaders in the matter of both tonnage and number of orders, though there has been some slight decline from the point of greatest activity. For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes 3/4 in. and over, and usual card extras for smaller sizes; shafting 53 per cent. off.

Rivets and Bolts.—The large rivet making capacity available for supplying the needs of this market is more than ample to provide for current requirements, and concessions in price are accordingly the rule. Bolt prices likewise show irregularities of about 5 per cent. We quote from mill as follows: Carriage bolts up to 1/8 x 6 in., rolled thread, 75-10; cut thread, 75-5; larger sizes, 70-2½; machine bolts up to 3/8 x 4 in., rolled thread, 70-10-5; cut thread, 75-10; large size, 70-7½; coach screws, 80-10; hot pressed nuts, square head, \$5.70 off per cwt.; hexagon, \$6.30 off per cwt. Structural rivets, 3/8 to 1 1/4 in., 2.38c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to 3/8 x 4 in., 70-7½; larger sizes, 65-5, carriage bolts up to 3/8 x 6 in., 70-5; larger sizes, 65 off. Hot pressed nuts, square head, \$5.30, and hexagon, \$5.90 off per cwt.

Old Material.—About the only activity in the local scrap market is the trading between dealers and other handlers of scrap to fill back orders. A local buyer of heavy melting steel came in the market but in a few days had entirely covered his requirements on the basis of \$11. With this exception consumers have been almost entirely out of the market. Lower prices are the rule. The railroads are offering additional scrap, apparently with a willingness to sell freely at the going prices. The Chicago & Eastern Illinois has a list of 600 tons; the Chicago, Milwaukee & St. Paul, 2300 tons, and the Indiana Harbor Belt, 600 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	\$15.75 to \$16.25
Old steel rails, rerolling	14.00 to 14.50
Old steel rails, less than 3 ft.	12.00 to 12.50
Relaying rails, standard section, subject to inspection	24.00
Old carwheel	14.25 to 14.75
Heavy melting steel scrap	10.75 to 11.25
Frogs, switches and guards, cut apart	11.00 to 11.50
Shoveling steel	10.50 to 11.00
Steel axle turnings	9.50 to 10.00

Per Net Ton.

Iron angles and splice bars	\$15.00 to \$15.50
Iron arch bars and transoms	15.25 to 15.75
Steel angle bars	10.75 to 11.25
Iron car axles	19.75 to 21.25
Steel car axles	17.75 to 18.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.50 to 11.00
Cut forge	10.50 to 11.00
Steel knuckles and couplers	11.25 to 11.75
Steel springs	11.50 to 12.00
Locomotive tires, smooth	12.25 to 12.75
Machinet shop turnings	5.75 to 6.25
Cast and mixed borings	5.25 to 5.75
No. 1 busheling	9.25 to 9.75
No. 2 busheling	7.00 to 7.50
No. 1 boilers, cut to sheets and rings	7.75 to 8.25
Boiler punchings	12.25 to 12.75
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	11.75 to 12.25
Agricultural malleable	10.50 to 11.00
Pipes and flues	8.25 to 8.75

Wire Products.—May specifications for wire in various forms have fallen behind those of April and, with the exception of wire nails, quite markedly. With respect to fencing and barb wire this is to be explained by the fact that the farmers are now in the field. Rapid expansion in the output of steel fence is noted. We quote as follows to jobbers: Plain wire, No. 9 and coarser, base, \$1.78; wire nails, \$1.98; painted barb wire, \$1.98; galvanized, \$2.38; polished staples, \$1.98; galvanized, \$2.33, all Chicago.

Cast-Iron Pipe.—The award for about 5000 tons of pipe for San Diego, Cal., has been formally made to the United States Cast Iron Pipe & Foundry Company. It carries specifications for a fair proportion of large sizes from 30 in. down. This company also took orders for 1000 tons for Evansville, Ind., 1100 tons for Highland Park, an outlying district of Detroit, Mich., and about 500 tons for Port Huron, Mich. The award of 1000 tons for Cincinnati, Ohio, is to be made this week. Demand for the larger sizes of pipe has been conspicuous by its absence, but the substantial aggregate of orders for the small sizes has established the prices for the latter on a basis of increased firmness. We quote as follows per net ton, Chicago: Water pipe, 4 in., \$28.50; 6 to 12 in., \$26.50; 16 in. and up, \$25.50, with \$1 extra for gas pipe.

Philadelphia

PHILADELPHIA, Pa., May 20, 1913.

Eastern mills are receiving good specifications on contracts and continue to operate at full capacity, although new business has generally been quiet. Billet makers are being pressed for deliveries on orders and are falling behind on shipments. The same condition prevails in sheets. Pig-iron buyers still keep out of the market for anything beyond early needs. Virginia foundry has been sold more freely at lower prices. Threatening conditions in the foundry labor situation have had some influence on the market, molders asking for an advance of 25c. a day. Foundry coke has been slightly more active and inquiries for forward furnace coke are before the trade. Old material is quiet, with prices unchanged.

Iron Ore.—Some negotiations have been under way with Eastern consumers for the sale of Texas ore. One contract involving probably 50,000 tons is based on a trial cargo which is to arrive at an early date. Shippers of foreign ore have been seriously inconvenienced by a longshoremen's strike here, several vessels now being tied up. An advance of 5c. an hour is demanded. Importations during the week were confined to 5897 tons of Swedish ore.

Pig Iron.—Several sellers who have recently been holding at prices above the market met competitive quotations during the week, with resulting heavier sales, but the aggregate tonnage moved shows practically no change. The general range of prices is narrower, \$16.75 to \$17 representing the full spread of the market for standard eastern Pennsylvania No. 2 X, delivered in this vicinity. While prices can not be said to be strong, concessions are harder to obtain, as selling prices approach the cost of production. Several producers are considering further curtailment of output. Sales have been mostly confined to small lots for early shipment. Virginia producers who have been holding pretty firmly at \$14.50, furnace, for No. 2 X foundry, have reduced prices 50c. a ton and their sales, while small individually, have been more numerous. At the present basis No. 2 X Virginia foundry is quoted at \$16.80 to \$17, delivered in this district. Cast-iron pipe makers have not been very active buyers, odd lots of off grade iron selling around \$15.75, delivered at Delaware River points. Offers for round lots of low-grade Southern iron have been made at prices well under the market, but are not being considered by sellers. Pig-iron consumers generally are conservative and will buy for immediate needs only until the market reaches what may be considered the bottom. At the same time labor difficulties which confront the foundry trade have some bearing on the situation. Foundry operations have not yet been seriously interfered with and few shipments have been held up. As a rule deliveries are taken as promptly as ever and in instances are being urged. Some large buyers, particularly in New England, are testing the market for round lots for forward delivery, but no definite orders are reported. Forge iron for rolling mill purposes is extremely quiet. A little more activity in steel-making grades has developed. Sales of small lots of standard analysis low phosphorus iron have been made at \$23.50

here, while moderate lots of Lebanon Valley low phosphorus have been sold at \$19 at furnace. One inquiry for 3500 tons of basic iron, for delivery over the remainder of the year, has come out, but sellers are not particularly keen for the business. Quotations for standard brands, covering early delivery in buyers' yards in this district, range about as follows:

Eastern Pennsylvania No. 2 X foundry	\$16.75 to \$17.00
Eastern Pennsylvania No. 2 plain	16.50 to 16.75
Virginia No. 2 foundry	16.80 to 17.00
Virginia No. 2 plain	16.55 to 16.75
Gray forge	15.75 to 16.00
Basic (nominal)	16.50
Standard low phosphorus	23.50

Ferroalloys.—Small sales of 80 per cent. ferromanganese have been made at \$59.25, seaboard, although some sellers hold at \$60. For forward delivery the nominal quotation is \$61. Furnace ferrosilicon has been in light demand, small lots of 10 per cent. having been sold at \$26.30 delivered here.

Billets.—Eastern mills are receiving heavy specifications against contracts and some are falling behind on deliveries. Little new business can be taken on for shipment over the remainder of the second quarter. A moderate miscellaneous demand for both rolling and forging billets continues, although less inquiry is noted for material for extended forward delivery. Prices are unchanged, basic open-hearth rolling billets, for near future shipment, being quoted at \$28 to \$30 here, with ordinary analysis forging billets at \$34 minimum at Eastern mill.

Plates.—About an even volume of business is coming to Eastern makers, who are receiving a satisfactory volume of specifications against orders in hand. While prices for ordinary business are being well maintained at 1.75c. delivered here, Western plates may be had at 1.60c. to 1.65c. here, but deliveries, while improved, are not yet as satisfactory as can be done by Eastern makers. It is stated that one of the Eastern mills was the low bidder on something over 5000 tons of plates for naval colliers, to be built on the Pacific coast, 1.50c. and 1.60c. at mill being bid.

Structural Material.—Mills are congested on small sizes of plain shapes, early deliveries on which still command a premium. There is, however, a general falling off in the demand for large sizes, and some mills, supposed to be comparatively well supplied with orders, are anxious for new business and can make good delivery. On the medium and larger plain shapes prices range from 1.60c. to 1.65c. delivered here. Fabricated work is in lighter demand. Bids are in on 12 small bridges for the Delaware, Lackawanna & Western Railroad and some of the pending contracts for building material have been closed.

Sheets.—Deliveries are steadily hardening and Eastern mills are being urged for faster deliveries. Specifications have been heavy and a satisfactory run of miscellaneous small orders is coming out. Mill capacities are taken for some time ahead. Prices are firm, both Eastern and Western sheets for reasonable delivery being quoted on a basis of 1.90c. here for No. 10 blue annealed, although for prompt shipment Eastern smooth-rolled sheets frequently command 1.95c. delivered.

Bars.—Current business is made up of odd lots but makers adhere pretty closely to recent quotations. Ordinary iron bars are maintained at 1.50c. at mill for car-load lots, or 1.57½c. here, although on small lots, and for the better grades, 1.62½c., delivered, is easily obtained. Outside of miscellaneous business, little has been doing in steel bars, which are quoted at 1.55c. to 1.60c. here.

Coke.—Signs of greater activity in both foundry and furnace grades are apparent. More small lot business in foundry grades has been done at \$3 to \$3.25 at oven for the better grades, although down to \$2.75 can be done on some brands. One large inquiry for second-half furnace coke, said to aggregate 60,000 tons, is before the trade. Contract furnace coke is quoted at \$2.35 to \$2.50 at oven, according to grade, while prompt furnace coke has been quoted at \$2.15. For delivery in buyers' yards in this district the following range per net ton is named:

Connellsville furnace coke	\$4.05 to \$4.50
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	3.75 to 4.10
Mountain foundry coke	4.50 to 5.00

Old Material.—The market is quiet, buying being confined to small lots. Consumers of most grades show little interest in the market, taking on small lots to fill in, usually obtaining them at comparatively low prices. Outside of transactions between dealers, there has been little movement in heavy melting steel. Prices are to

a large extent nominal, in most grades not enough business being transacted to establish a firm quotation. The following range is named for small lots for early delivery in buyers' yards in this district, covering eastern Pennsylvania at nearby points, taking a freight rate varying from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel	\$12.00 to \$12.50
Old steel rails, rerolling (nominal)	15.00 to 15.50
Low phosphorus heavy melting steel scrap	17.00 to 17.50
Old steel axles (nominal)	17.50 to 18.00
Old iron axles (nominal)	26.00 to 27.00
Old iron rails	18.00 to 18.50
Old carwheels	13.50 to 14.00
No. 1 railroad wrought	15.00 to 15.50
Wrought-iron pipe	12.00 to 12.50
No. 1 forge fire	11.00 to 11.50
No. 2 light iron (nominal)	6.75 to 7.25
No. 2 cut busheling	8.50 to 9.00
Wrought turnings	9.00 to 9.50
Cast borings	9.00 to 9.50
Machinery cast	13.50 to 14.00
Grate bars, railroad	10.00 to 10.50
Stove plate	10.00 to 10.50
Railroad malleable (nominal)	12.50 to 13.00

Cincinnati

CINCINNATI, OHIO, May 21, 1913.—(By Telegraph.)

Pig Iron.—The market is simply drifting, with most buyers sitting idly, awaiting a change. Southern iron continues to show weakness, evidence of which is in several sales made at \$11.50, Birmingham basis. The largest recorded sale at this figure was 500 tons to a northern Ohio melter. There are reports that firm offers below the price named would be accepted in some quarters, but these cannot be substantiated. The high cost of production has so far held Northern iron firm at \$15, Ironton, for No. 2 foundry, for either prompt or last-half delivery. Malleable is more active. There is an inquiry from Indiana for 1000 tons for last-half shipment, and for the same delivery a Missouri manufacturer bought a like quantity. Foundry iron inquiries are limited to small lots, and the largest general one before the trade is from Indiana calling for 1000 tons. Southern iron will probably be purchased. Traveling pig-iron salesmen report buyers as in a very receptive mood, but inclined to be cautious in making contracts for future requirements. One of the leading iron merchants here, who has followed the market closely for several years, predicts the commencement of a heavy buying movement early in June or probably before. A couple of small inquiries for silvery iron came out last week. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	\$15.25 to \$15.75
Southern coke, No. 2 foundry and 2 soft	14.75 to 15.25
Southern coke, No. 3 foundry	14.55 to 14.95
Southern, No. 4 foundry	14.35 to 14.85
Southern gray forge	14.15 to 14.65
Ohio silvery, 8 per cent. silicon	20.20 to 20.70
Southern Ohio coke, No. 1	17.20 to 17.70
Southern Ohio coke, No. 2	16.20 to 16.70
Southern Ohio coke, No. 3	15.95 to 16.45
Southern Ohio Malleable Bessemer	16.20
Basic, Northern	16.20 to 16.45
Lake Superior charcoal	18.75 to 19.25
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—The blast furnace operators are beginning to wake up, and it is stated that a number are on the point of negotiating for a last-half supply. Several inquiries are out for 48-hr. coke, but it is understood most of these come from consumers in the East and South. One inquiry calls for 10,000 tons a month, with shipments beginning July 1. Prices are a trifle firmer, due to a large extent to labor shortages. There is some buying of foundry coke, but little call for extended deliveries. We quote Connellsville standard furnace brands from 2.15c. to 2.25c. per net ton at oven, the higher figure representing the average future shipment price, although probably half of the oven operators are asking more. Wise County and Pocahontas quotations range about 10c. a ton higher. The average price on foundry coke is around \$3 per net ton at oven in all three fields, the range running all the way from \$2.75 to \$3.25.

Finished Material.—Mill agencies report a fair number of inquiries, but business is slow in closing. The cities of Hamilton and Dayton will soon have specifications ready for several bridges washed away during the floods. Warehouse quotations are unchanged around 2.10c. to 2.15c. for steel bars and 2.15c. to 2.20c. for structural shapes. Blue annealed No. 10 sheets are quoted from stock at 2.40c.

Old Material.—The situation is not improving, and in some respects the market is the most unsatisfactory for several years. Yard stocks are heavy, and offerings

are in advance of material shipped out. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	\$9.50 to \$10.00
Old iron rails	13.00 to 13.50
Relaying rails, 50 lb. and up	20.00 to 20.50
Revolving steel rails	12.00 to 12.50
Melting steel rails	10.00 to 10.50
Old carwheels	11.75 to 12.25

Per Net Ton.

No. 1 railroad wrought	\$10.00 to \$10.50
Cast borings	5.25 to 5.75
Steel turnings	5.25 to 5.75
No. 1 cast scrap	9.75 to 10.25
Bronze scrap	7.00 to 7.50
Old iron axles	17.25 to 17.75
Locomotive tires (smooth inside)	11.00 to 11.50
Pipes and flues	6.50 to 7.00
Malleable and steel scrap	8.25 to 8.75
Railroad tank and sheet scrap	5.25 to 5.75

Cleveland

CLEVELAND, OHIO, May 20, 1913.

Iron Ore.—The Cleveland ore firm that was offering some ore at a reduction of 25c. per ton from regular prices has disposed of this grade and announces that it has no more for sale except at regular prices. The ore in question was a small amount that had been on a Toledo dock for several years. Other ore firms are adhering to regular quotations on standard ores, and it is probable prices will be maintained throughout the season. No new inquiries are coming out. A number of the furnace companies are in need of ore for their mixtures and the bulk of the tonnage that is now being shipped is going directly to the furnace yards. We quote prices as follows: Old range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.60; Mesaba non-Bessemer, \$3.40.

Pig Iron.—There is an increased amount of inquiry for foundry iron, but few sales are reported. Consumers are sounding the market and keeping in close touch with the situation, but generally are putting off their purchasing until they believe prices have reached the bottom. The market is very weak. Spot sales at \$14.50 at furnace for No. 2, noted last week, were followed by a few last-half contracts at the same price and \$14.50 is now the general quotation for the last half both by Valley furnaces and by Cleveland furnaces for outside shipment. A northern Ohio consumer has purchased several hundred tons from a Cleveland furnace at that price. To meet Valley competition in Cleveland a local furnace has reduced its price to \$15.25, delivered Cleveland, for No. 2. However, one sale is reported at \$15.50. One Cleveland foundry secured prices a few days ago on 500 tons, but has not yet placed its order. With profits nearly wiped out by present low prices, several sellers have withdrawn from the market and declare that they will not meet current quotations. The expected decline in Southern iron to \$11.50, Birmingham, for No. 2 has materialized. Several producers are making that their quotation for delivery the remainder of the year. For shipment through the year we quote, delivered Cleveland, as follows:

Bessemer	\$17.50
Basic	16.25
Northern No. 2 foundry	\$15.25 to 15.50
Southern No. 2 foundry	15.85 to 16.10
Gray forge	15.00
Jackson County silvery, 8 per cent. silicon	20.55

Coke.—The market is quiet and prices are stationary. Few foundries have as yet placed contracts for their last-half requirements. Standard 72-hr. foundry coke is quoted at \$2.75 to \$3 per ton at oven for prompt shipment and for the last half. We quote furnace coke at \$2.15 to \$2.25 for prompt shipment and \$2.25 for contract.

Finished Iron and Steel.—While mill orders are light the demand for material out of warehouse continues heavy. There is a further easing up in deliveries. One mill that is in a position to take on tonnage for the last half has booked a number of Bessemer steel bar contracts for that delivery at 1.40c. Pittsburgh. The same interest is offering steel bars for prompt shipment at 1.45c. to 1.50c. Plates can be had at 1.50c. Pittsburgh, for delivery in 10 days. The gradual disappearance of premium prices and the improvement in deliveries have resulted in a falling off in orders placed with Eastern mills for steel for prompt shipment. However, these mills are generally adhering

to recent prices. Early in the year many consumers placed contracts and furnished specifications for their requirements for the remainder of the year, but there are many of the consumers who will need additional steel in the last half. Some of these are delaying the placing of their contracts, thinking that perhaps prices may go lower. The demand for structural material is fairly good. Local fabricating shops have about all the work they can do for the next two or three months. Recent orders have nearly all been for small work. New building projects include a 12-story building that is contemplated by the National Bank of Commerce, Toledo. The demand for sheets is moderate but mills are well filled with orders. While the general quotations appear to be 2.35c. for No. 28 black and 3.40c. for No. 28 galvanized, prices as low as 2.25c. for the former are reported to have been made for desirable orders. Local bar iron prices are unchanged at 1.60c. to 1.65c., Cleveland. Some price cutting is reported in the West, and these prices are being shaded to meet the competition. Warehouse prices are 2.10c. for steel bars and 2.25c. for plates and structural material.

Old Material.—Prices have further sagged 50c. a ton on heavy steel scrap borings, turnings and busheling. On other grades in which there had been no transactions quotations are nominal. Some dealers feel that prices have about reached the bottom. The only activity is in small lots. One local consumer who was offering \$12 for heavy melting steel two weeks ago will now pay only \$11.50. Other Cleveland mills are not in the market for this grade. Local dealers are being offered only \$7.50 per gross ton in Pittsburgh for turnings. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton.

Old steel rails, rerolling	\$14.00 to \$14.50
Old iron rails	16.00 to 16.50
Steel car axles	18.75 to 19.25
Heavy melting steel	11.50 to 12.00
Old carwheels	14.50 to 15.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	11.75 to 12.00
Railroad malleable	13.00 to 13.50
Light bundled sheet scrap	9.50 to 10.00

Per Net Ton.

Iron car axles	\$21.00 to \$21.50
Cast borings	6.50 to 6.75
Iron and steel turnings and drillings	5.00 to 5.25
Steel axle turnings	8.50 to 9.00
No. 1 busheling	10.50 to 10.75
No. 1 railroad wrought	12.00 to 12.50
No. 1 cast	11.75 to 12.00
Stove plate	9.00 to 9.50
Bundled tin scrap	11.00 to 11.50

Birmingham

BIRMINGHAM, ALA., May 19, 1913.

Pig Iron.—In spite of good to fair conditions in other branches of the metal trades in the South, the pig-iron situation continues listless and comparatively little business is being done. It is conceded that some Tennessee furnaces are selling under \$12, and it is currently believed that some iron has been disposed of around \$11.75 in Alabama. The consensus of opinion is that much business will be done under \$12, but furnace interests as a rule show no anxiety to anticipate possible further concessions by offering low prices now. Trading appears to be based largely upon offers made to furnace agents and by them submitted to the furnace principals for special consideration of each proposal. Selling prices in some instances are coming close to the cost mark and operators are becoming cautious. The companies having coke plants and other advantages naturally feel the pinch less severely. A sale of 1000 tons of No. 2 at \$12 is reported, and some No. 2 soft of specially suitable quality brought \$12.50 for a 500-ton lot. The average of car loads and other small quantities was around \$12. Some charcoal iron has sold at \$24.50. The Republic Iron & Steel Company will blow out one of its three furnaces at Thomas next month, but the new Woodward will come in. The Republic stack to go idle has been operating steadily and well for three and a half years. Quotations per gross ton f.o.b. furnaces are about as follows:

No. 1 foundry and soft	\$12.25 to \$12.75
No. 2 foundry and soft	11.75 to 12.25
No. 3 foundry	11.25 to 11.75
No. 4	10.75 to 11.25
Gray forge	10.25 to 10.75
Basic	11.75 to 12.25
Charcoal	24.50 to 25.00

Cast Iron Pipe.—Shipments of accumulated stocks in the water pipe foundry yards have been brisk, but there has been no spurt in new business. Gas pipe has been moving in considerable quantities, the city of Tus-

caloosa, Ala., receiving 14 miles. Several sizable contracts are reported pending. Rapid progress is being made on the new plant of the National Cast Iron Pipe Company and it expects to enter the trade by October. We quote 4-in. pipe at \$22.50 and 6-in. and upward at \$20.50 f.o.b. cars, with \$1 added for gas pipe.

Coal and Coke.—The coke situation has changed very little for several months. The output is large and all is being taken. We quote per net ton f.o.b. cars at ovens: Furnace coke, \$3 to \$3.50; foundry, \$3.50 to \$4.25. Coal mines are enjoying an excellent season, with steam coal mines supplied with orders taking up the output for some time to come.

Old Material.—Machinery cast and light steel grades are in some demand, and relaying rails are always salable, but otherwise movements from the yards are inconsiderable. Prices, per gross ton for f.o.b. yards, are as follows:

Old iron axles	\$15.00 to \$15.50
Old steel axles	15.00 to 15.50
Old iron rails	13.50 to 14.00
No. 1 railroad wrought	12.50 to 13.00
No. 2 railroad wrought	10.50 to 11.50
No. 1 country wrought	10.00 to 10.50
No. 2 country wrought	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	11.00 to 11.50
Standard carwheels	12.00 to 12.50
Light cast and stove plates	8.50 to 9.00

St. Louis

ST. LOUIS, Mo., May 19, 1913.

Slackening of new business in finished products and weakness in pig iron are moving hand in hand in this market, but the consumption of material—finished, semi-finished and raw—continues unabated with even some anticipation of allotments and practically no requests to hold up shipments except such as are occasioned by physical conditions at plants and not due to business developments.

Pig Iron.—The situation in pig iron continues to show weakness in quotations, but at that small lots are going at figures better than the regularly quoted prices of other markets. A number of sales reported for the week, though not of large tonnage, were at \$12 for No. 2 Southern, Birmingham basis. Nevertheless, \$11.75 is coming to be the accepted price, though representatives are not content to make contracts at this figure without the approval of the furnaces. Sales reported include quite a number of Southern iron in lots of 50 to 300 tons, 500 tons of Lake Superior charcoal and 1000 tons of malleable. The inquiries pending are all for small quantities.

Old Material.—The market is stagnant and quotations made are nominal. Dealers are showing an indication of preparation to fill their yards against future developments, believing that the bottom has been reached. The railroad lists reported last week were all closed at low prices and the material was well scattered. The only new list out is one of 500 tons from the Frisco. Relayers are in demand, with none to be had. Some inquiry is coming from steel foundries. We quote dealers' prices, f.o.b. St. Louis, as follows:

<i>Per Gross Ton.</i>	
Old iron rails	\$12.75 to \$13.00
Old steel rails, re-rolling	13.00 to 13.25
Old steel rails, less than 3 ft.	11.00 to 11.25
Relaying rails, standard section, subject to inspection	22.50 to 23.50
Old carwheels	13.50 to 13.75
Heavy melting steel scrap	11.00 to 11.25
Frogs, switches and guards cut apart	10.50 to 10.75

<i>Per Net Ton.</i>	
Iron fish plates	\$11.50 to \$11.75
Iron car axles	19.00 to 19.25
Steel car axles	16.50 to 16.75
Wrought arch bars and transoms	14.00 to 14.25
No. 1 railroad wrought	10.75 to 11.00
No. 2 railroad wrought	10.25 to 10.75
Railway springs	9.00 to 9.25
Steel couplers and knuckles	9.00 to 9.25
Locomotive tires, smooth	11.00 to 11.25
No. 1 dealers' forge	7.50 to 7.75
Mixed borings	5.50 to 5.75
No. 1 busheling	9.00 to 9.25
No. 1 boilers, cut to sheets and rings	6.00 to 6.25
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	8.00 to 8.25
Railroad malleable	9.50 to 9.75
Agricultural malleable	8.00 to 8.25
Pipes and flues	6.50 to 6.75
Railroad sheet and tank scrap	5.50 to 5.75
Railroad grate bars	7.00 to 7.25
Machine shop turnings	6.75 to 7.00
Bundled sheet scrap	5.50 to 5.75

Coke.—Practically nothing is doing, though requisitions on contracts are still being freely made, confirm-

ing reports of continued melting by consumers. By-product coke is on an equality with Connellsburg prices, but little is being moved.

Finished Iron and Steel.—Reinforcing bars are still in very active demand and the deliveries much extended. The fabricating shops, having a good accumulation in their yards, are not as anxious to place either orders or specifications for structural steel as they were, largely because deliveries are in so much better shape. No large contracts are in immediate sight, though a hotel of medium size and an addition to a screw manufacturing plant are about due for a few hundred tons each, while the Ford assembling plant contractor took 500 tons during the week. Some bar consumers report themselves as having under-estimated their requirements and are asking to have shipments anticipated. The agricultural and wagon-making interests are taking all the material they can get. Track fastenings are in fair request.

Standard Oil Needs More Tin Plate

General Trade Continues Dull—Stocks of Pig-Iron Increasing—Steel Weak

(By Cable)

LONDON, ENGLAND, May 21, 1913.

The manipulation of Cleveland pig-iron warrants is nearing its end. Up to 70s. 2d. has been paid to cover short sales. The general trade position is very dull in both iron and steel. The Standard Oil Company is still inquiring for tin plate for the third quarter, bidding 14s. 6d. for oil sizes, but finding no sellers below 14s. 7½d. Semi-finished steel is weak on continued French offers. Stocks of pig iron in Connal's stores are 230,817 tons, against 222,499 tons last week. We quote as follows:

Cleveland pig-iron warrants (Tuesday), 69s. 6d. asked, against 68s. 3d. a week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 70s., against 68s. 3d. a week ago.

Ferromanganese, £11 12s. 3d., f.o.b. shipping port.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 5s., against £5 10s. a week ago.

German sheet bars, f.o.b. Antwerp, nominally 10s.

German 2-in. billets, f.o.b. Antwerp, nominally 10s.

German basic steel bars, f.o.b. Antwerp, £5 9s., a decline of 1s.

Steel bars, export, f.o.b. Clyde, £7 17s. 6d.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £7, a decline of 2s. 6d.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel strip plates, Scotch, delivered local yards, £8 7s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 15s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 14s. 3d.

A Tendency to Lower Prices in Semi-Finished and Finished Steel—Tin Plate Buying

(By Mail)

LONDON, May 10, 1913.

The situation in Cleveland pig iron remains without any alteration, the bulls still holding the market in their clutches and showing not the slightest sign of relaxing. Consumers all over the country hold off so long as artificial conditions persist. In the last few days some of the American buyers of ferromanganese have been trying to induce the sellers here to ship ahead of the contract dates so that the proposed new and higher duty may be avoided, but without result, for the sellers say that such accommodation should be paid for, and to this the buyers will not agree.

Semi-finished steel is weak. Some French works (Micheline) have lately been selling at very low prices, and this brought down the ideas of the Belgians, but ostensibly the German Steel Works Union holds out for recent rates, though, without doubt, it would meet competition on anything like a round lot. There is no point in carving up prices for little lots. One of the regular customers of the Steel Corporation is trying to fix up a deal for sheet bars, but at this writing without result.

The feature in iron and steel has been the renewed appearance in the tinplate market of the Standard Oil Company. As indicated by cable, this company has

placed about 250,000 boxes of its usual specifications for shipment to America, paying up to 145 7/8d and 20s od, shipment to be made up to June 10, while big lines have been done for Canada, both east and west. All this has put heart into the Welsh trade, but the buying as far as can be ascertained seems to have arisen in part from the flood trouble with American mills and from the potent fact that Welsh prices were below the actual costs of production. With steel on the down grade, however, it is possible that some of the business may be covered in raw material at a profit. Richard Thomas has reopened the eight mills he shut down recently at Llanelli. Other works, however, are restricting operations, but the general belief is that the worst has now been seen of the crisis.

In finished steel the tone is one of depression, and though prices are not quotably lower the tendency is unmistakably to a lower level. Continental products are being pressed for sale freely, especially bars, and this is giving rise to a most uncomfortable feeling, particularly as the big steel works rolling heavy material like ship plates are beginning to get through their orders.

German Business Still Shrinking

Orders Falling Behind Shipments—Pig Iron and Billets Firm, but Other Products Lower

BERLIN, May 9, 1913.

New orders are apparently still shrinking in volume, while prices not fixed by strong trade combinations continue to decline. The last week's trading in iron and steel products on the Düsseldorf Exchange brought out further reductions. Bars were quoted at 114 to 118 marks, against the previous price of 116 to 120 marks; heavy plates at 128 to 131 marks, against 130 to 135; boiler plates, 138 to 143 marks, against 140 to 145; sheets, 135 to 140 marks, against 140 to 145. And these prices do not represent the lowest level of the market. It was reported yesterday by the Cologne Gazette that steel bars are now being offered by some mills at 111 to 112 marks, and that dealers are even offering them as low as 109 to 110 marks. The latter prices, however, are rather to be regarded as speculative and for remote deliveries. The same authority says that sheets are now offered at 130 to 132 marks, against a maximum price of 142 marks reached last October, and that the export price then 134 to 135 marks is now 119 to 122 marks. The home price of heavy plates has fallen to 123 to 125 marks from 133 to 135 marks, and the export price of 118.50 to 122 marks from 131 marks.

Belgian Prices Lower

The drop of prices also continues in Belgium. A Brussels dispatch reported at the beginning of the week that manufacturers had reduced all grades of plates for export 2 to 3 shillings owing to the growing scarcity of orders. Another Brussels dispatch of this morning states that the prices of iron and steel bars and plates has further dropped 2.50 francs for the home trade but that there is a slight improvement in a few other lines.

The feeling of uncertainty about further developments in the trade remains unchanged. Although the political situation appears much brighter than a week ago, manufacturers of finished products are saying that their position has grown more unfavorable owing to the increased cost of production brought about by the advance of coal prices at the beginning of April. The prospective further increase of production in several lines is also a disturbing factor. There is still a tendency in the trade to believe that the sluggishness in new business will give way soon to greater activity, now that the latest war-clouds are again rolling away. It is argued that much new business has been held up by the long political uncertainty, and that it must come out.

In the ore trade there is little if any change. The mines in the Siegerland region are working at their full capacity and are still unable to make shipment as fast as ores are wanted. Although ocean freights have further receded, making it possible to buy Mediterranean and Spanish ores at more favorable terms, not much business has been done in these, contracts having been placed some time ago for pretty long periods. Manganese ores from the Black Sea continue firm.

Pig Iron Strong and Semi-Finished Steel Firm

Pig iron continues to enjoy a strong position. Buying for the second half-year has been brisk, and the Syndicate will soon be in a position to distribute the production among the various producers. The April

production reached 1,587,000 tons, as against 1,628,000 tons for March, and 1,451,000 tons for April, 1912. The month would have shown up still more favorably but for the fact that production in the Silesian district was reduced about 10,000 tons through a strike of coal miners. The production for the first four months of the year was about 700,000 tons more than for the like period of 1912. Scrap iron has become somewhat firmer.

The position of semi-finished steel remains satisfactory. Calls for deliveries on contracts are coming in at a normal rate, and the open-hearth works outside of the Union are also able to dispose of their product without difficulty. Foreign business continues quiet, with buyers avoiding long-term engagements, and the Union is taking new orders at somewhat lower prices to meet Belgian and French competition.

The home trade in structural shapes continues dull. Besides the large home orders for heavy steel rails, considerable foreign business is being taken; hence work on rails is at the full capacity of the mills, with orders running far ahead. There has also been an increased business in light rails, and both the home and foreign demand for grooved rails is heavy. Shops running on track-building supplies are also well stocked with orders.

Lines in Which the Situation Is Less Favorable

In bars, little new business is coming in. The total of orders in hand is still pretty large, but they are steadily being worked off. It has become more difficult to obtain foreign orders. Business in iron bars remains good, with all the works well employed and orders running for the most part to the end of the year, and even longer.

Steel skelp is somewhat weaker, with prices 130 to 135 marks. Business in gas pipe is bad but it is somewhat better in boiler tubes.

In plates not much business is coming in, and there is considerable price cutting. In galvanized sheets there is still considerable home trade, but foreign business is hard to get, and prices are yielding. Good orders are in hand for tin plates, but new business is slow.

In wire rods, orders on hand extend to about the end of June, and new orders come in slowly. Home orders for wire are of considerable volume, with urgent calls for delivery. There is a lively foreign demand for the lighter sizes, but in heavy gauges there is considerable pressure on prices. In wire nails home consumers have placed orders to the middle of the year, but little is doing for remoter dates. Export business continues difficult, owing to sharp competition from American and other producers.

Buffalo

BUFFALO, N. Y., May 20, 1913

Pig Iron.—Some improvement in inquiry is noted but actual sales are exceedingly light. The aggregate business in all grades for the district was not over 5000 tons for the week. Buyers are still holding off waiting for any further lowering of prices. Labor troubles among foundries in some districts and the general uncertainty in the business outlook are contributing causes for the pronounced conservatism. There is, however, no slackening in the taking of iron on existing contracts. There are rumors of lower prices having been made in a few instances on special deals or at private offers, but such transactions are not of a character or in sufficient number to establish a market below the schedule appended. In malleable iron very little business is offering. Charcoal has dropped to a range of \$17 to \$18 for regular brands and analysis. We quote as follows for current quarter and last-half delivery, f.o.b. Buffalo:

No. 1 foundry	\$15.50 to \$16.00
No. 2 X foundry	15.00 to 15.50
No. 2 plain	15.00 to 15.25
No. 3 foundry	15.00
Gray forge	15.00
Malleable	15.50 to 16.00
Basic	16.00 to 16.50
Charcoal	17.00 to 18.00

Finished Iron and Steel.—Most of the sales agencies report that specifications are continuing to come in in somewhat less volume than shipments are being made, but there are no suspensions and no cancellations and pressure for delivery continues to be about as urgent as at any time in the past six months. There are no indications that consumption is falling off. The demand for black and galvanized sheets is active and prices are

well maintained. In fabricated structural material a good demand is noted in small lots. Bids are being taken for a distributing depot and stable building at Niagara Falls, N. Y., for the Gerhard Lang Brewing Company, Buffalo. The Standard Structural Steel Company, Buffalo, is low bidder for the steel for the municipal bath house, Perry street, Buffalo, 125 tons, and the C. F. Ernst Sons Company, Buffalo, was low bidder for the 100 tons of steel for the St. Bartholomew Church of this city. The Buffalo Structural Steel Company has received the contract for the steel for the Niagara County court house at Lockport, N. Y., 100 tons, and the George Kellogg Structural Company, Buffalo, the contract for the fabricating and erecting of the 500 tons of steel for the new high school building at Williamsport, Pa.

Old Material.—The market is dull, dealers showing a disinclination either to sell or to buy for stock and there is almost a complete absence of demand both from local users and from those throughout the district, resulting in a falling off in prices. Heavy melting steel shows a slight recession in price, as the principal consumer of the district is still deferring the taking on of any tonnages on contracts. Wrought iron and soft steel borings and No. 1 busheling have also declined in price. The slack condition of the market is tending to exceedingly close inspection of material and a larger ratio of rejection on the part of users. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$12.00 to \$12.75
Boiler plate, sheared	15.00 to 15.50
No. 1 busheling scrap	11.00 to 11.50
No. 2 busheling scrap	9.00 to 9.50
Low phosphorus steel	17.00 to 17.50
Old iron rails	15.00 to 15.50
No. 1 railroad wrought	14.00 to 14.50
No. 1 railroad and machinery cast scrap	13.75 to 14.25
Old steel axles	17.50 to 18.00
Old iron axles	24.00 to 24.50
Old carwheels	15.00 to 15.50
Railroad malleable	13.25 to 13.75
Locomotive grate bars	10.50 to 11.00
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	10.00 to 10.50
Wrought iron and soft steel turnings	6.50 to 7.00
Clean cast borings	8.00 to 8.50
Bundled tin scrap	17.00

New York

NEW YORK, May 21, 1913.

Iron Ore.—Swedish ore has been offered recently in the general market for shipment this year, after a good many months in which there was practically no movement to this country apart from shipments on the Bethlehem Steel Company's nine-year contract. Ocean freights have declined by 1s. to 1s. 6d. and there has been a slight falling off in the German demand for Scandinavian ores; but, even so, the 64 or 65 per cent. product of Lapland mines costs close to 9c. a unit at eastern Pennsylvania furnaces. Due to the Mount Hope iron mine strike and the cutting off also of shipments from the nearby Richard mine there have been some sales recently of New York State and northern New Jersey ores at the prices heretofore named, somewhat under 8c. delivered. It is expected that east Texas ores will be shipped to Philadelphia, beginning in June, at the rate of two cargoes a month on a 50,000-ton contract with the Alan Wood Iron & Steel Company. The haul from the mines is over the Santa Fé Railroad and shipments are made over the dock at Port Bolivar.

Pig Iron.—There is more inquiry and sellers have more ground for believing some of these will result in early business than has existed for several weeks. Two or three consumers have asked for round lots, and a number apparently need to buy iron for delivery before July 1. The real situation as to prices will be developed doubtless by some of the inquiries for third quarter and second half. Sellers have not been offering iron, the situation being one which is not helped by concessions. It is reported that Buffalo iron can be had on the basis of \$15 at furnace for No. 2 X, which on the basis of canal freights would put iron at some New England water points at a figure which eastern Pennsylvania and Virginia furnaces have not yet been willing to meet. There is some New England inquiry. A number of foundries in that district have been closing for their coke supply for the third quarter and second half at a shade under \$3.25 at ovens. Foundries in this district are generally operating up to their recent rate, though in some cases there has been a slight easing off. Some quiet buying of pipe iron is reported in eastern Pennsylvania, but the picking up of pipe grades in larger or smaller lots is something the market has al-

ways with it. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, \$17.25 to \$17.50; No. 2 X, \$16.75 to \$17; No. 2 plain, \$16.50 to \$16.75. Southern iron is quoted at \$17.25 to \$17.50 for No. 1 foundry and \$16.50 to \$16.75 for No. 2.

Structural Material.—The continued indifference of capital is a conspicuous feature of the dullness in the inception of new projects and in contract closing. Mills are still very busy with little betterment in deliveries and the good volume of new business, showing that a high percentage of production is going into immediate consumption, is having a strong influence in counteracting an occasional pessimistic attitude regarding the promise of the remainder of the year. Decisions are expected early on about 1400 tons for 12 bridges for the Delaware, Lackawanna & Western Railroad; on several hundred tons of lattice girder cores and other steel work for a reinforced concrete building in Jersey City for the National Carbon Company, and on 600 tons for a public market in Newark, N. J.; and other new work includes about 2000 tons for a theater on Forty-seventh street, New York; the Plaza Hotel in Newark; about 600 tons on an apartment house on which figures are now being taken; a round tonnage for grade elimination work for the New York Central at Rochester, Suspension Bridge, Camillus and other points; an apartment building at Broadway and 103d street on a plot about 160 x 175 ft., and 800 tons for the Brooklyn Plaza of the Manhattan bridge. Among recent awards may be mentioned 500 tons for the Flushing high school building to the Hedden Iron Works; 600 tons for the Crystal building to the Alfred E. Norton Company, as well as about 1000 tons in lots of 100 tons and over to various fabricators for railroad work. Mill shipments are obtainable in six weeks at 1.45c. Pittsburgh with 1.50c. for earlier delivery, and 2.15c. from store.

Plates.—Rumors persist of 1.50c. business from Eastern mills, but it is doubtful if there is much at this price for deliveries in less than two months. Certainly there is the usual volume moving for shipment within a few weeks at 1.60c. Pittsburgh, and with a payment occasionally of \$1 a ton additional for universal plates, although this, as stated some weeks ago in this column, is less frequent. One buyer who maintained that he could get 1.50c. Pittsburgh from Eastern mills subsequently placed the business representing a fair tonnage at the 1.60c. price. We continue to quote 1.61c. to 1.66c. New York, for mill shipments in the last half and 1.76c. New York, for delivery in two to four weeks.

Bars.—The market has been disturbed by the active canvass for business by a steel plant which recently put a new bar mill into operation. Numerous offers have been made to supply material, including small sizes which are generally difficult to get elsewhere before December, at the ruling market quotation of 1.40c. Pittsburgh, for delivery in a few weeks. It is believed that this fact has resulted in some cancellations with other mills. In some quarters buyers are reported as exhibiting less bearishness and instead of attempting to withhold purchases are buying steadily to meet current needs. No change is reported in bar iron (some of the mills actively searching for bar iron business while others take it only at the higher range of prices), while bar iron products are easy a regards delivery. We quote bar iron at 1.60c. to 1.65c. New York, and steel bars 1.56c. New York, deliveries depending on the mill. Store prices are 2.05c. for steel bars and 2.10c. for iron bars.

Ferroalloys.—Representatives of English producers of 80 per cent. ferrromanganese continue to quote \$61. Baltimore, although it is conceded that sales of small lots for prompt delivery have been made by second hands at \$59.25, Baltimore. It is not believed that the supply in the hands of merchants will last long. Inquiry has been confined to carload lots. Ferrosilicon, 50 per cent., is unchanged at \$75. Pittsburgh, for carloads, \$74 for 100 tons and \$73 for 600 tons and over. Shipments against contracts are heavy but inquiry is light.

Cast-Iron Pipe.—Newark, N. J., will open bids Thursday, May 22, for about 600 tons of 36 in. The public lettings are few and far apart. The general demand from private consumers shows no particular activity. Prices of carload lots of 6 in. are \$23 to \$24 per net ton at tidewater, New York.

Old Material.—Steel works and rolling mills appear to have their wants covered and are not only refusing to buy more, but are requesting shipments deferred on old contracts. In fact, the yards at their plants are

badly congested with stocks of old material. Borings and turnings are a drug on the market. The foundries are doing little in the purchase of cast scrap at present. The general market on old material, which has been steadily declining has further weakened under heavy offerings from railroads and others having accumulations of scrap. Dealers having contracts to fill have been able to cover some at excellent profits. The outlook seems unfavorable for an early recovery in prices. Quotations are nominal, being about as follows per gross ton. New York, inside figures representing prices now being offered by dealers:

old order and T rails for melting.	\$9.50 to \$10.00
Heavy melting steel scrap	9.50 to 10.00
Grooving rails	22.00 to 22.50
Grooving rails	12.50 to 13.00
Iron car axles	22.50 to 23.00
Old steel car axles	14.50 to 15.00
No. 1 railroad wrought	12.25 to 12.75
Wrought iron track scrap	11.50 to 12.00
No. 1 yard wrought, long	11.25 to 11.75
No. 1 yard wrought, short	10.25 to 10.75
Lamp iron	4.00 to 4.50
Cad borings	6.00 to 6.50
Wrought turnings	6.00 to 6.50
Wrought pipe	9.50 to 10.00
Old carwheels	12.50 to 13.00
No. 1 heavy cast, broken up	11.00 to 11.50
Steel plate	8.75 to 9.25
Locomotive grate bars	7.50 to 8.00
Malleable cast	10.00 to 10.50

Metal Market

NEW YORK, May 21, 1913.

The Week's Prices

	Copper, New York.	Cents Per Pound for Early Delivery.					
		Electro- lytic, Lake.	Tin, New York.	New York.	St. Louis.	Lead	New York.
May							
12	16.00	15.75	48.05	4.35	4.20	5.50	5.30
13	16.00	15.75	48.75	4.35	4.20	5.45	5.30
14	16.00	15.75	... 16.00	4.35	4.20	5.45	5.30
15	16.00	15.75	48.10	4.35	4.20	5.45	5.30
16	16.00	15.75	47.87½	4.35	4.20	5.45	5.30
17	16.00	15.75	48.25	4.35	4.20	5.45	5.30

Copper is quiet, with a weaker tendency. Tin is lower and until yesterday was dull. Lead is quiet and slightly easier. Spelter has declined still further and business is lacking. Antimony continues weak and inactive.

New York

Copper.—The unsettled state of the foreign market, with declines day after day for almost a week, caused by speculative influences, brought about uneasiness and a certain amount of weakness here. The local market has been on the whole lacking in business. The large sellers have adhered to their price of 15.75c., cash, New York, and $\frac{1}{2}$ c. higher for delivery in the Naugatuck Valley, cash, 30 days, but within the week there have been sales of resale lots at 15.60c. to 15.65c., though not nearly enough to make the market. Prompt delivery Lake is nominal at 16c., cash, New York, but very little can be had this side of July, as the producers are understood to have sold out on early deliveries. Future delivery might be found at 15.87 $\frac{1}{2}$ c., cash, New York. The price in London this morning was £68 18s. 9d. for spot and £68 13s. 9d. for futures. Exports continue at an excellent rate and this month total 25,906 tons.

Pig Tin.—The market was very dull until yesterday when activity developed in the afternoon and between 200 and 250 tons of spot and nearby delivery was sold. The market resembles that of copper inasmuch as it has been dominated by London conditions. The foreign market has been highly speculative, one house for instance having sold three months tin very freely, while another which was believed to be acting for Vienna interests sold prompt metal, the result being to force the market down everywhere and inflict another blow to confidence in this country. Domestic consumers are still well supplied and probably will be for some time, although they may be expected to buy to fill in immediate wants from time to time. The price quoted in New York this morning was 48.25c. The London price was £230 for spot and £215 10s. for futures. The arrivals this month total 2677 tons and there is afloat 1615 tons.

Lead.—This metal is very dull and has a slightly easier tone. A few moderate sized orders are being placed here and there, but big business is lacking. The New York price is 4.35c. and that in St. Louis 4.20c., though in the last week a sale was made at 4.22½c., St. Louis.

Spelter.—A further decline brought prices down to 4.45c., New York, and 5.30c., St. Louis, and there has been talk of shading. Spelter is generally admitted to be

very cheap, in fact, so much so that there is said to be no money in it for producers or sellers at its present level. While the market is dull there does not appear to be any sufficient reason for the very low prices. High grade spelter is being consumed in large quantity by the brass mills, but the deliveries are against old contracts.

Antimony.—Low prices, which are practically nominal because of the lack of demand, continue. As has been the case for some time, the metal is being offered at quotations substantially below the import price. Hallett's is quoted at 8.25c. to 8.30c.; Cookson's at 8.75c., and Chinese and Hungarian grades at 7.50c.

Old Metals.—The market is moderately active. Dealers' selling prices have been reduced in some instances and are as follows:

	Cents per lb.
Copper, heavy and crucible	15.00 to 15.25
Copper, heavy and wire	14.75 to 15.00
Copper, light and bottoms	13.00 to 13.25
Brass, heavy	9.50 to 9.75
Brass, light	8.25 to 8.50
Heavy machine composition	13.75 to 14.00
Clean brass turnings	8.75 to 9.00
Composition turnings	11.50 to 12.50
Lead, heavy	4.25
Lead, tea	4.00
Zinc, scrap	4.50

Chicago

MAY 20.—Metal sales have been closely confined to small lots to cover consumers' immediate needs, but the number of orders has been such as to bring the volume of business up to an average figure. The copper position is still firmer and some of the smelters are asking a further advance for Lake. Tin prices fluctuated freely during the week, with a net decline. We quote as follows: Casting copper, 15.75c.; Lake, 16c. to 16.25c. in carloads for prompt shipment; small lots, $\frac{1}{4}$ c. to $\frac{3}{8}$ c. higher; pig tin, carloads, 49.50c., small lots, 51.50c.; lead, desilverized, 4.35c. to 4.40c.; corroding, 4.60c. to 4.65c., for 50-ton lots; in carloads, $\frac{1}{2}$ c. per 100 lb. higher; spelter, 5.50c. to 5.60c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc is \$7.75, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14c., copper bottoms, 12.75c.; copper clips, 13.50c.; red brass, 12.75c.; yellow brass, 9.50c.; lead pipe, 3.90c.; zinc, 4.35c.; pewter, No. 1, 33c.; tinfoil, 38c.; block tin pipe, 44c.

St. Louis

MAY 19.—Dullness, with some weakness, has prevailed during the week. Lead closed to-day at 4.20c.; spelter, 5.30c.; Lake copper, 16.35c.; electrolytic copper, 16.22½c.; tin, 49.10c. to 49.35c.; Hallett's antimony, 9.10c. to 9.35c. The Joplin ore market reflects the situation in metals. The basic price for zinc blende during the week was \$43.50 with the choicest lots bringing \$46.50. The strength of the situation was in the second grade ores, none of which sold below \$41. The calamine demand was fair with the range for 40 per cent., \$19 to \$21, while the choicest lots sold as high as \$27.50. Lead ore was weaker and sold for \$52.50 for 80 per cent. The decreasing reserve supply is looked to as a source of strength in the market for the future. On miscellaneous scrap metals we quote as follows: Light brass, 6c.; heavy brass and light copper, 9.50c.; heavy copper and copper wire, 11c.; pewter, 25c.; tinfoil, 34c.; zinc, 3.50c.; lead, 3.50c.; tea lead, 3c.

Flexible Metallic Tubing

The Pennsylvania Flexible Metallic Tubing Company, whose office is at Broad and Race streets, Philadelphia, and factory at Seventy-second street and Powers lane, West Philadelphia, Pa., has erected its own plant for the rolling, annealing, galvanizing, etc., of the metal to be used in the manufacture of its product. An experience of 12 years in the handling and manufacture of flexible metallic tubing has led the managers of the company to the conviction that, to produce a serviceable metal hose, special compositions of metal must be used and the greatest care taken in their rolling and preparation. The development of its own plant will enable the company to secure the uniform metal which its product demands. The hose manufactured by this company is made in all sizes, running from $\frac{1}{8}$ to 12 in. in diameter and adapted to the highest pressures of steam, oil, air, etc. An illustrated booklet has been prepared for distribution, giving full details of the great variety of tubing manufactured by this company.

Iron and Industrial Stocks

NEW YORK, May 21, 1913.

The market for securities has been fairly steady, though inclined to quietness. Some pressure made its influence felt on Cambria Steel stock on Thursday when the price receded sharply, but it afterward recovered more than the loss. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can., com....	31½ - 33½	Pressed Steel, pref.....	95½
Am. Can., pref....	92½ - 93	Railway Spring, com.....	27
Am. Car & Fdy., com... 48 - 48½		Railway Spring, pref. 91 - 91½	
Am. Car & Fdy., pref. 113 - 113½		Republic, com..... 23 - 23½	
Am. Loco., com.... 32½ - 33		Republic, pref..... 80½ - 82	
Am. Loco., pref..... 102		Rumely Co., com..... 27½	
Am. Steel Foundries.... 31		Rumely Co., pref..... 54 - 55½	
Bald. Loco., com.... 47 - 48		Sloss, pref..... 90	
Bald. Loco., pref.... 104½ - 105½		Pipe, pref..... 47½	
Beth. Steel, com.... 32½		U. S. Steel, com.... 59 - 60½	
Beth. Steel, pref.... 69½ - 71		U. S. Steel, pref.... 105½ - 106½	
Colorado Fuel 31 - 31½		Westinghouse Elec.... 61½ - 62	
Deere & Co., pref.... 98		Am. Ship, com.... 50	
General Electric ... 137½ - 139		Chic. Pneu. Tool.... 49½ - 49½	
Gr. N. Ore Cert.... 33½ - 34½		Cambria Steel 45½ - 48½	
Int. Harv., com.... 104½		Lake Sup. Corp.... 26 - 26½	
Int. Harv., new.... 102½ - 104½		Pa. Steel, pref..... 64 - 65	
Int. Harv., pref., new. 111 - 112½		Warwick 10½	
Int. Harv., Corp.... 102½ - 104½		Crucible Steel, com.... 13½ - 14	
Int. Harv., Corp., pref.... 111½		Crucible Steel, pref.... 87½ - 88	
Nat. En. & St., com. 12 - 12½		Harb. Walk Ref., com.... 45	
Nat. En. & St., pref.... 80		La Belle Iron, com.... 41½ - 46	
Pittsburgh Steel, pref.... 94½		La Belle Iron, pref. 122 - 123	
Pressed Steel, com.... 24½ - 24½			

Dividends Declared

The Harbison-Walker Refractories Company, regular quarterly 1½ per cent. on the common stock, payable July 2.

The Youngstown Sheet & Tube Company, regular quarterly, 1¾ per cent. on the preferred stock, and 2 per cent. on the common, payable July 1; also a dividend of 50 per cent. on the \$10,000,000 increase in common stock voted on by the stockholders recently. This will be payable out of the surplus of the company, for which certificates will be issued July 1 to stockholders of record May 14.

Freight Rates on Fabricating in Transit

The Interstate Commerce Commission has suspended from May 15 to September 12 important proposed increased freight charges on structural steel and iron by the Baltimore & Ohio, Erie, Pennsylvania and other railroads, pending investigation. The tariffs filed proposed to advance the charges applicable to shipments of structural iron and steel stopped in transit for fabrication at points throughout central freight association territory, except certain fabrication points located in Illinois. Under the present rate provisions a carload of structural iron or steel, namely, beams, plates, tees, bolts, bars, etc., shipped from Pittsburgh to Chicago may be stopped at Toledo, Ohio, to undergo further process of manufacture and then forwarded to destination at the Pittsburgh-Chicago rate plus 1½c. per 100 lb. The suspended rate proposed to increase this charge to 1c. per 100 lb., making it 2½c. Some of the fabrication points affected are Buffalo, N. Y.; Zanesville, Ohio; Toledo, Ohio; Columbus, Ohio; Mt. Vernon, Ohio, and Muncie, Ind.

The Obenberger Drop Forge Company now has in operation its new plant at Cudahy, Wis., a suburb of Milwaukee. It has erected a forge and machine shop equipped with the most modern drop hammers, steam smithing hammers, saws, drills, lathes, etc. The shop was specially built for the company's purposes and is of steel fireproof construction. A catalogue is being compiled, to be ready for distribution in about a month, which will give a complete list of forgings which will be carried in stock for immediate delivery.

The New England Foundrymen's Association held a well-attended monthly meeting at Hartford, Conn., May 14. In the afternoon members enjoyed an automobile ride about the city, and in the evening dined at the Allyn House, afterward listening to an interesting talk by Henry M. Lane, Detroit, Mich., on "The Control of Temperature and Other Conditions in the Baking of Cores." The address was copiously illustrated with lantern slides.

Personal

J. M. Keller has been appointed chief engineer of the Otis Steel Company, Cleveland, Ohio, and will have general charge of the engineering work in connection with the company's new steel plant. Specifications for the plant equipment will be sent out by the Otis company, which will also receive bids and place contracts. Mr. Keller was formerly engineer of the rolling mill and special machinery department of the William Tod Company, Youngstown, Ohio.

W. A. Keirn, for several years advertising manager of the Mesta Machine Company, Pittsburgh, has resigned, effective June 1, and will become connected with the advertising department of the Industrial World of that city.

Fletcher Collins, formerly with Naylor & Co., iron and steel factors, Pittsburgh, is now connected with Banning, Cooper & Co., Ltd., Pittsburgh, iron, steel and coke, Oliver Building, Pittsburgh.

Robert S. Alter, secretary American Tool Works Company, Cincinnati, Ohio, has returned from an extended business trip to Europe.

George H. Griffiths, who has been Chicago district manager of *The Iron Age* for four years, has removed to New York City, having been made manager of the Hardware Age, which is the new name of the consolidated Iron Age-Hardware and Hardware Reporter.

At the annual election of the Cleveland Engineering Society, Cleveland, Ohio, held May 13, William O. Henderer, president Osborn Engineering Company, was elected president, and E. H. Whitlock, factory manager of the National Carbon Company, was elected vice-president. Monroe Warner and James H. Herron were elected directors.

James H. Baker, forging engineer, has recently removed from Pittsburgh to Cleveland, where his address is 4501 Lakeside avenue.

C. H. Domhoff, of the Domhoff & Joyce Company, has returned to Cincinnati from an extended vacation trip to the Pacific coast.

J. Chaleyer, of J. Chaleyer & Co., Melbourne, Australia, dealers in iron and steel products, is now on his way to the United States and will be in New York City about June 10.

R. W. Hutchinson, Jr., advertising and publicity manager of the International Motor Company, Broadway and Fifty-seventh street, New York City, has resigned, effective June 1. He has filled this position since the organization of the company, and prior to that was connected in a similar capacity with the Saurer Motor Company. He has been one of the most prolific writers on motor topics in the country for the past three years. His plans for the future have not been disclosed.

J. E. Johnson, Jr., has tendered his resignation as manager of the Ashland, Wis., blast furnace and chemical plant of the Lake Superior Iron & Chemical Company, effective July 1.

At a meeting of the board of directors of the Standard Chain Company of Pittsburgh last week W. A. Myler, of the Standard Sanitary Mfg. Company, Pittsburgh, was elected vice-president, succeeding Robert Garland, resigned.

Col. Charles M. Jarvis, president American Hardware Corporation, New Britain, Conn., is dangerously ill, and has been confined to his room for the past three weeks.

J. C. Manternach has been advanced to the position of general manager of the Standard Welding Company, Cleveland, Ohio, succeeding Tracy W. Guthrie, resigned. He had been sales manager from April, 1910, and he is widely known among those connected with bicycle, motorcycle, automobile and steel tube industries. Mr. Manternach announces the appointment of S. W. Hartley as sales manager, advancing him from assistant sales manager. R. S. Bryant is named as consulting engineer, and C. C. Gressle as superintendent. F. R. Wilhelmy remains as auditor and credit manager, and H. E. Butcher continues in charge of the tube department.

Walter R. Hay, of Naylor, Benzon & Co., Ltd., London, England, which is identified with Naylor & Co., New York, is now in this country.

Samuel Mather, Pickands, Mather & Co., and William G. Mather, president Cleveland-Cliffs Iron Company, have returned from a European trip.

Among those elected to membership in the Iron and Steel Institute at the meeting in London May 1 and 2 were the following: Clarence Levy Altemus, metallurgical engineer, Johnstown, Pa.; Clarence Hiram Beach, Midvale Steel Works, Philadelphia; Christopher Robert Corning, consulting engineer, New York; Frederick Crabtree, professor of metallurgy, Carnegie Technical Schools, Pittsburgh; Senator S. W. Dorsey, mining engineer, Los Angeles, Cal.; John Howe Hall, consulting engineer, New York; Leslie D. Hawkridge, metallurgist, Boston; Frank Burton Lounsherry, H. H. Franklin Mfg. Company, Syracuse; Karl W. Zimmerschied, General Motors Company, Detroit, Mich.

J. H. Plummer, of the Dominion Iron & Steel Company, Sydney, Nova Scotia, attended the recent meeting of the Iron and Steel Institute in London and was one of the speakers at the annual dinner.

C. F. Chase, sales manager of the Falk Company for the past year, has resigned to accept the position of general sales manager of the Standard Separator Company, Milwaukee. He was formerly with the International Harvester Company and more recently with the M. Rumely Company, LaPorte, Ind., as manager of foreign sales for two years.

Alexander Legge has been appointed general manager of the International Harvester Company of New Jersey and the International Harvester Corporation, to succeed C. S. Funk, who resigned to take the management of the M. Rumely Company. Mr. Legge has been assistant general manager since 1906. George A. Ranney was named as secretary of the Harvester companies.

Strike of Buffalo Machinists

A general strike of machinists in Buffalo was inaugurated Monday morning, May 19, and it is reported that 3000 men are out, tying up practically every machine shop in the city. Nearly every plant is picketed. The men have recently been organized and their demands include: "That all men who have been discharged during the past month for being members of the union be reinstated; that working hours consist of nine hours per day and five hours on Saturday; that none but members of the International Association of Machinists be employed on any work over which the I. A. of M. has jurisdiction; that machinists have the right to select a shop committee of three in the plant to submit to their employers any grievance that may arise pertaining to bringing about more pleasant relations and satisfactory working conditions; that any grievance that cannot be adjusted between representatives of employers and shop committee be submitted to arbitration within five days from time such grievance may arise to a committee of three, one to be selected by the employers, one by the employees, the two to select a third party, and pending their decision that there be no strike or lock-out; that the minimum rate for machinists be 37½c. per hour, specialists 30½c., tool and die makers 40c., die sinkers 60c., machine shop helpers 25c.; all outside contract erecting work the minimum rate shall be \$4.50 per day for eight hours; all men receiving more than the minimum to suffer no reduction in wages with the introduction of the fifty hour week; piece and premium work to be abolished; that all overtime after regular quitting time up to 10 o'clock nights to be paid for at the rate of time and one-half, and after 10 o'clock nights at the rate of not less than double time; that in case of slackness in work the company agrees to reduce the number of hours worked per day whenever practical before any general reduction of force takes place and when it is found necessary to reduce the force, one apprentice be laid off for every five journeymen."

The principal bones of contention are the 50-hour week and the closed shop. It is reported that the machinists are to make their contests this year at Buffalo and Los Angeles, Cal. The Manufacturers' Association at Buffalo has decided to resist the demands firmly even to an indefinite closing of their shops.

Pittsburgh and Vicinity Business Notes

The Model Gas Engine Company, Peru, Ind., has let the contract for the building of its new plant at Homewood, near Pittsburgh, to the Nicola Building Company, the architect being the W. G. Wilkens Company, Pittsburgh. It is intended to make this an ideal plant for the manufacture of gas and gasoline engines and considerable new equipment will likely be required.

The Riter-Conley Mfg. Company, Pittsburgh, has received a contract for rebuilding the furnace of the Clinton Iron & Steel Company at Pittsburgh, which recently collapsed after being blown out. It is expected to have the furnace ready for blast in July.

The Dawson Pump Company is considering the purchase of the plant of the Altoona Foundry & Machine Company, Altoona, Pa., which has been closed for five years, and then putting it in operation as soon as possible.

The Latrobe Tool Company, Latrobe, Pa., has been organized with a capital stock of \$60,000 and will build a plant for the manufacture of machine tools.

The report of the wage committee submitted in convention to the Amalgamated Association in session at Fort Wayne, Ind., recommends material advances in wages for puddling, muck rolling and finishing. Minimum and maximum weights governing sheet and tin plate mills will remain unchanged. It is stated that the entire scales governing sheet and tin plate mills will be on the same basis as the present scales.

The St. Marys Machine Company, at St. Marys, Ohio, has increased its capital stock from \$15,000 to \$250,000.

The United Sons of Vulcan met in annual convention in Pittsburgh last week. The puddlers belonging to this organization have been receiving a flat rate of \$6 a ton since July 1 last year, and there is considerable dissatisfaction among them. The organization will probably ask for a material advance for the year beginning July 1.

The Pettler Steel Mat & Mfg. Company, Beaver Falls, Pa., has purchased the plant of the Glen Mfg. Company, Ellwood City, and will move the equipment there. This will probably require an additional building.

The American Flexible Bolt Company, Pittsburgh, has been organized with a capital stock of \$250,000, and proposes to build a plant.

The Society of Automobile Engineers and the Institute of Automobile Engineers of England will spend Thursday, May 29, in Pittsburgh on the way to Detroit, Mich., to hold their semi-annual meeting on June 4 to 7. The members will visit the Homestead works of the Carnegie Steel Company and the McKeesport works of the National Tube Company. In the evening a dinner will be given at the Fort Pitt Hotel.

The Leetonia Steel Company, First National Bank Building, Pittsburgh, now building an open-hearth steel plant at Leetonia, Ohio, has let a contract to the Penn Bridge Company, Beaver Falls, Pa., for the bar mill building, 70 x 320 ft.; storage building, 70 x 96 ft., with crane runway at one end, and gas producer building, 28 x 216 ft. About 475 tons of steel will be used in these buildings.

Hubbard & Co., Pittsburgh, manufacturers of shovels, spades and scoops, are building an addition to their plant, 100 x 350 ft., to cost about \$75,000.

The Aluminum Company of America, Pittsburgh, will build a small plant at Arnold, near its present works at New Kensington, Pa., for the manufacture of aluminum foil which is used for somewhat similar purposes as tin-foil, especially in the building of electrical apparatus and for photographic work. The product will be turned out in sheets on a rolling mill, which is the first mill of its kind to be built in this country and is experimental to some extent.

The Standard Scale & Supply Company, Pittsburgh, with works at Beaver Falls, Pa., has recently taken out a charter in Illinois to comply with the State law. The company has maintained for some years a warehouse in Chicago, its representative being M. H. Reed, 1345-1347 Wabash avenue.

The Pittsburgh Railways Company will increase the capacity of its power plant on Brunots Island, Pittsburgh, from 25,000 k.w. to 85,000 k.w., and bids are being taken

for generators for 60,000 k.w. A contract has been placed with the Pittsburgh office of the Babcock & Wilcox Company for twenty Sterling boilers of 882 hp. capacity each, with the Westinghouse Machine Company for four 15,000 k.w. turbo generator sets, and with the Pittsburgh office of Henry R. Worthington for condensers and pumps. Estimates are being taken on the stoker equipment for the boilers.

The Epping-Carpenter Company, Pittsburgh, has received a contract to supply a vertical triple expansion pumping engine for water works at Jefferson City, Mo. The work is in charge of Chester & Fleming, hydraulic engineers, Pittsburgh.

The Venango Mfg. Company, Franklin, Pa., maker of railroad supplies, is adding a pattern shop and storage building, 40 x 140 ft., two stories. Individual motors are to be installed in the entire plant to replace large motors and shafting, 16 of various sizes, aggregating 200 hp., being ready to install.

The William H. Page Boiler Company, Meadville, Pa., is adding a new core room of brick and saw tooth construction, 50 x 110 ft. New core ovens and a hand traveling crane will be installed.

The Carnegie Steel Company is operating 51 of its 59 blast furnaces. The idle stacks are one Isabella, Neville Island, Edith, one Mingo Junction, one Carrie, Steubenville, Zanesville and one South Sharon. The Mingo Junction, Carrie, South Sharon and Isabella stacks are being relined and will be started as soon as ready. The Neville Island, Edith, Steubenville and Zanesville are isolated stacks and have not been operated for some years.

The George J. Hagan Company, Pittsburgh, has received a contract for the furnace equipment for the new tin plate plant of the Wheeling Sheet & Tin Plate Company. It calls for the building of 10 sheet and pair furnaces and four box annealing furnaces, all to be operated by American underfeed stokers. This installation is a duplicate of that made by the Hagan Company a year or more ago for the Washington Tin Plate Company, Washington, Pa. The same builder recently completed six combination sheet and pair furnaces and three double box annealing furnaces at the new sheet mill plant of the Apollo Steel Company, Apollo, Pa. All stokers called for in these contracts will be manufactured by the American Stoker Company, New York City.

Obituary

FRANK O. BRIGGS, first assistant treasurer of the John A. Roebling's Sons Company, Trenton, N. J., died May 8. Mr. Briggs recently concluded a six years' term as United States Senator from New Jersey.

A Development in Plain Bearings

The Use of Phosphorus as a Scavenger in Copper Alloys

From some notes collated by J. F. Springer, New York, on journal bearings has been taken the following:

The development and improvement in connection with plain bearings has been along three lines: 1, Design; 2, lubrication; 3, materials of the parts. Such bearings involve a slide of metal upon metal. It was found out long ago that if both the contracting metals were the same that the friction would generally be greater than where they were different. Thus, cast iron sliding upon cast iron would develop more friction than cast iron sliding upon brass. The underlying reason is thought to be as follows:

All metals, whether polished or not, do not present perfectly smooth surfaces; there are minute, not to say microscopic, depressions scattered everywhere. Further, it is not unreasonable to suppose that the non-depressed portions lying between the thickly scattered depressions are of similar size and form as compared with the depressions. Assuming the foregoing to be correct, one will be prepared to understand that when two surfaces of the same material press against each other, there will be a greater amount of interlocking than would be the case where the surfaces belong to different metals having different structures. Cast iron rubs hard on cast iron because the protruding particles fit well into the intervening depressions. For the time being, this theory or hypothesis may be ac-

cepted. We have in it the explanation why the practice is so general of using a journal of one material and a box of another.

But even under the best conditions, dry metal sliding on dry metal will produce enormous friction and great wear. It is ancient history that this can be wonderfully reduced by the use of an intervening liquid—the lubricant.

Now the design of a bearing has to take these things into account. Smith & Marx in their recent work on "Machine Design" enumerate four items in design: 1, Provision must be made to take care of possible rupture or an excessive yielding; 2, provision for permanence of form; 3, provision for the retention of the lubricant; and 4, provision against overheating. To cover requirements 2 and 4, account must be taken of the material which enters into the making of the boxes. In journals subject to severe conditions it is necessary that the material of the boxes have a fairly high melting point. Otherwise, the bearing would be frequently liable to deformation, not to say destruction, from avoidable and unavoidable overheating. It has, accordingly, become quite general to construct bearings subject to heavy duty from some alloy of copper. Pretty much everywhere where iron or steel journals have to support heavy loads or otherwise undergo severe service, the usual practice is to use a tin alloy of copper (bronze) or a zinc alloy of copper (brass). But copper itself is subject to damage from the oxygen of the atmosphere when raised to certain high temperatures. Phosphorus has been found to be a corrective of this.

If phosphorus is present under favorable conditions when copper is heated, the former substance will keep the oxygen busy and thus save the copper from the bad effects. But phosphorus is a difficult substance to manage. The pure material is probably never used. When the good offices of this substance are required in connection with the purification of the liquid bronze or brass for use in a bearing, the pure chemical is not employed, but some complex material containing phosphorus is used instead. Thus, Metallic Phosphoro, made by the New Era Mfg. Company, Kalamazoo, Mich., is a prepared metallic substance containing phosphorus. The material acts as a flux and deoxidizing agent in connection with the casting of bronze and brass mixtures. Its precise constitution is a guarded trade secret, but its general operation and the like are not. One of the first things to note is that bearing boxes and other bronze castings must be poured from the first melting in which Metallic Phosphoro is employed, if the best results are to be obtained. It will not do to pour an ingot of the purified bronze and then remelt this ingot later on when casting the article wanted. It is not altogether clear perhaps just what takes place, or why it is that the remelting has a damaging effect. But the fact itself is well substantiated.

It is probable that Metallic Phosphoro operates pretty much as vanadium and titanium are supposed to do in connection with steel—that is as a scavenger. The amount required is indicated by the three accompanying formulas for bronzes adapted for railroad car journal bearings. It will be observed that lead forms one of the constituents of these mixtures; in fact, 8 per cent. of each bronze. The influence of Metallic Phosphoro is said to overcome the difficulty experienced in securing a union of lead and copper. It will be noted that the sum of the weights of tin

Bronze Formulas for Journal Boxes Subjected to Heavy Service

	A	B	C
	Parts by weight	Parts by weight	Parts by weight
Copper	80	80	80
Tin	10	10½	11
Lead	8	8	8
Metallic Phosphoro.	2	1½	1

and Metallic Phosphoro is constant in all three formulas. Bronze A has the greatest crushing resistance; while C has the greatest tensile strength. Bronze B surpasses in elastic quality.

The W. Robertson Machine & Foundry Co., Buffalo, manufacturer of the Economy line, has just perfected, in addition to its regular belt and motor driven hach saws, a new two-speed saw designed for plants having a variety of work and thus requiring greater flexibility in speeds. The new machine will permit of changing from soft steel to hard or tool steel by throwing a clutch. The company is also doubling the size of its plant.

President Farrell's Recital Takes a Wide Range

(Continued from page 1243)

isted in the country, and when our customers were loaded up with millions of dollars of goods who might, perhaps, in the case of a radical change of values, become involved, large numbers of them, in bankruptcy.

Mr. Farrell further said that during that time prices made by different manufacturers were fluctuating; not widely, but they were fluctuating.

Getting a Footing in Foreign Markets

Mr. Severance asked Mr. Farrell again about the steps taken to get a foothold in foreign markets. In reply Mr. Farrell said:

"All the markets were practically pre-empted by foreign manufacturers and merchants, with branch offices and warehouses in all the consuming centers. It was a very difficult thing to enter those markets. There was not only

a prejudice against newcomers but hostility in most cases. In order to get a foothold in these markets, we usually had to sell below the prices of the concerns that were established there, and who had their customers and native salesmen and all the advantages that go with a long occupation in a foreign country.

"Maintaining a system of warehouses throughout the world is a hazardous business, because fluctuations in prices occur while the goods are in transit. However, having a diversified product lessens the risk, because, as the price of one article goes down, that of another may come up, and the average business is more or less a stationary factor. Then it seldom happens that there is depression all over the world. A manufacturer having only one line of goods cannot afford to maintain warehouses. It was tried by the National Tube Company before the formation of the Steel Corporation. That company established a large warehouse at Johannesburg, and was obliged to abandon it because of fluctuations in prices of materials, and because of the high cost of doing business, which was over 8 per cent."

Charles M. Schwab Testifies for Corporation

Narrates Its Early History—Talks of the Old Trade Pools—Does Not Fear the Great Corporation

On Monday, May 10, Charles M. Schwab, former president of the United States Steel Corporation, took the stand and was examined by Richard V. Lindabury, attorney for the defense. Asked regarding his recollection of the selling of the Carnegie interests, he brought out one point that had not been told before when he said that Henry C. Frick first tried to sell the Carnegie properties to Standard Oil interests through H. H. Rogers. He then told in full detail the manner in which the late J. P. Morgan had the proposition of forming a great iron and steel corporation brought to his attention. This is the same story as that told by Mr. Schwab before the Stanley Committee and reported in *The Iron Age* of August 10, 1911.

The Corporation's Competitors

"The competitors existing at the time of the organization of the Steel Corporation," said Mr. Schwab, "have grown very rapidly; for example, the Bethlehem Steel Company, growing in six years from an output of \$6,000,000 to an output of \$44,000,000. There has been no change in the business since the filing of the Government's present suit."

Q. What has been the policy of the United States Steel corporation when you were president and since, as far as you know, in regard to labor conditions, competition and uniform treatment of customers? A. I thought that we should treat labor in the most liberal manner possible and pay the highest prices going for different reasons; one was we felt that the attitude of a great corporation would be carefully scrutinized. There has been a steady increase of wages and has been a great general improvement in labor conditions; in fact, competitors have been forced to "follow suit." The policy of the Steel Corporation has been not to stifle or destroy, but by naming a fixed open price, to help stabilize conditions. We never varied from our quoted prices except in a minor degree to a few very large consumers. I have never heard of any secret prices, and local undercutting or any attempt to get business from competitors by secret rebates.

Q. How about conditions existing previous to the formation of the Steel Corporation? A. (Laughingly.) The Carnegie method was to get all the business it could at any price necessary to get it.

Pools or Combinations

Mr. Schwab said he had nothing to do with the Jackson wire pools. He had talked with Mr. Jackson, who explained his methods, but he did not approve of them and told him so.

Q. Were there pools in which the United States Steel subsidiaries were members? A. There were a few "hold-

overs," I think, in structural steel and plates, but I do not remember distinctly. These hold-over pools were quite modified as compared with the old pools. No penalties were exacted, as far as I know.

Q. To what extent did pools exist in the early days of the industry, before the Steel Corporation was formed, if you can set any limit to the pools? A. No; I could not set a limit, except to say that they existed in practically every branch of the business and in every possible direction. Personally, I did everything I could to lend my efforts to the promotion of pools at that period, because I thought it was a profitable thing to do.

In regard to the plate pool, which remained in existence after the corporation was formed, Mr. Schwab said it was established in 1900. "Judge Gary was opposed to pools," said he. "When I was president of the Steel Corporation one of the things I had to contend with was Judge Gary's opposition to these things I had been so long accustomed to. There were no very definite pools after I left."

The Price of Rails

Taking up the price of rails, Mr. Schwab said that the price of \$28 had been maintained because it was considered a fair price. Said he: "Personally, I think it is too low. It costs very much more today to make rails than when this price was first made. I never had a railroad man or a purchasing agent ask me for a lower price than that maintained. I would not drop 5c. in the price of my rail (referring now to the Bethlehem product) because I would get no more business and because it would make an awkward situation for us all."

Q. Has there ever been any agreement between you and your competitors since you have made open-hearth rails, as to the price of rails? A. None whatever.

Asked about the comparative cost to make steel rails by the Steel Corporation and its competitors, Mr. Schwab replied, "It costs me more, because I haven't investments in transportation and other such facilities."

Q. What is the cost to make an open-hearth steel rail? A. Excluding interest on investment and overhead charges and depreciation, it costs us between \$22 and \$23 per ton.

Purchase of Ore Properties

Q. Do you know about the purchase of the Lake Superior Consolidated Iron Mines? A. I do. I wanted to take over that company because I believed that the steel industry would expand far more rapidly than the general public or other people in the business believed it would and that very large ore reserves were needed. In fact, I believe that the corporation ought to have more ore today. Our company (the Bethlehem) has ore for 150 years ahead. In the early days of the corporation I could not

get our Finance Committee to see the necessity of making what I considered necessary purchases. We would get options and the Finance Committee would turn them down. Competitors would then take every one of the properties. There never was any talk or thought of monopolizing the ore or keeping it from competitors.

Q. Was anything ever done or proposed to place an unnatural advantage over competitors? A. No; except that we tried to get the best plants. The corporation did not adopt, and has not since adopted, as far as I know, any unfair methods toward any competitor in any part of the world. From the first time I talked with Mr. Morgan, the idea of monopoly has never come up. The whole object of the combination was for economic development alone.

Q. Why were some plants dismantled after they were taken over? A. We dismantled plants only when we found them inefficient or obsolete, or when we found we had other plants of the same type in the district producing more economically.

Q. You have been quoted several times as considering the corporation's ore supply in 1901 worth \$1 per ton. Have you ever had any reason to change your opinion? A. No; this opinion has been only confirmed. I have made offers personally and in behalf of the Bethlehem Steel Company at \$1 per ton in the Northwest with provisions so that there would be no risk to the seller and my offers have been refused within the past two weeks.

The Foreign Rail Pool

Q. Did you ever know of a foreign rail pool? A. I have never heard of it, either when I was president of the corporation or afterward.

Q. Did you ever hear of any agreement by which foreign rail producers undertook to keep out of the American market? A. I never heard of it.

Q. Has there ever been any agreement by which the Steel Corporation undertook to keep out of the foreign market? A. I have never heard of any.

Q. Could the Steel Corporation put its large competitors out of business? A. It couldn't put me out of business nor any of the other large corporations. They are fully capable of competing in all products.

Answering questions, Mr. Schwab said that the Steel Corporation had a moral influence in balancing the trade. Taking up the Gary dinners, he said that trade conditions were demoralized when those dinners began, and that many producers feared much lower prices. "A feature of the first dinner was the talk by Judge Gary, in which he said that we should not lose our heads but patiently wait for better times to come." Mr. Schwab said that he was a member of the general committee which was appointed and a member of one of the sub-committees appointed to take up each branch of the industry.

Q. Were there any agreements made as to prices or limits of output or agreement as to the division of territory made by either the general committee or the sub-committee? A. No. They were to compare notes as to the volume of business, prospects for business and similar questions.

Q. Had there been any such agreement made at or as a result of the Gary dinners? A. No, not to my knowledge.

Cross Examination by Government Counsel

Under cross examination by Judge Dickinson, Mr. Schwab told of pools in which the Illinois Steel Company and the Carnegie Steel Company had participated.

The cross examination as to pools continued on Tuesday. Mr. Schwab said that, as essentially he was an operating man, he knew little as to details of the pools though he knew of them, and was unable to identify absolutely those that Judge Dickinson took up as he read from the Government's testimony introduced earlier in the case.

Judge Dickinson devoted considerable time in attempting to prove that there was much potential competition in rail making, and showed that various companies had been paid to stay out of the business. Mr. Schwab said that companies sometimes made a product just so that they might compel admittance into pools.

Answering Judge Dickinson's attempts to prove that the Carnegie Company could manufacture products other than were made, Mr. Schwab told of the practical difficulties and of financial obstacles. He said: "At times I was obliged to halt construction. I was chief engineer in charge of construction as well as being general manager. The financial men of the company frequently impressed upon me the difficulties they had in securing the capital

to make extensions and I was obliged on different occasions to stop all construction work for this reason."

Asked about English rail manufacturers offering American makers an inducement to stay out of the foreign market, Mr. Schwab said that the inducement simply was not large enough and did not take in enough foreign manufacturers; that makers from other countries would have had to be included to make the proposition attractive. Mr. Schwab had not considered this attempted agreement in his previous testimony, though he said he would have entered into it had it been worth while.

"You were after something big," suggested Judge Dickinson.

"That is right," answered Mr. Schwab, cheerfully.

Mr. Schwab told of the proposed Empire Steel Company to market the rails of all the principal manufacturers. The plan was dropped because Mr. Carnegie saw trouble ahead since the company would be considered a trust, and meet with hostility.

The Influence of Silicon on Cast Iron Corrosion

At a recent meeting in London of the Iron and Steel Institute, a paper was presented on "The Influence of Silicon on the Corrosion of Cast Iron," by Dr. J. Newton Friend and C. W. Marshall. Attention was confined to the influence on corrodibility of silicon contents varying from 1.24 to 2.28 per cent. It was felt that this range covered many of the silicon contents usually met with in commercial cast iron and that with this range the silicon is never so great as to interfere with the nature of the carbon content.

The specimens of iron were cut into blocks measuring 4.8 x 1.1 x 1.5 centimeters, and after rubbing with emery paper were tested in this form. All the elements with the exception of silicon were present in remarkably uniform proportions. The samples were laid on sheets of paraffin wax in glass beakers containing 500 cc. of water taken from the faucet. After seventeen weeks the iron specimens were removed, carefully scraped free from rust, rinsed in alcohol and dried in a steam oven. They were then weighed and the loss in weight was taken as a measure of corrosion. Similar experiments were carried out with a 3 per cent. sodium chloride solution instead of water, and other experiments were made with the so-called alternate wet and dry exposure, with 0.05 per cent. sulphuric acid and with 0.5 per cent. sulphuric acid. It was found that the variation in the percentage of silicon between the limits stated had no appreciable influence of itself on the corrodibility of the cast iron.

The Standard Screw Company's Year

The annual report of the Standard Screw Company for the fiscal year ended March 31, 1913, places net profits after depreciation and expenses at \$373,657, compared with \$162,463 in the previous year. The net income available for dividends was \$327,602, an increase of \$202,349 over the previous year. After paying 6 per cent. in dividends on the preferred stock, earnings on the common stock amounted to \$207,602. From this 3 per cent. in dividends on the common stock was paid, which left a net surplus for the year of \$132,602. President W. B. Pearson says: "In my last report I mentioned the fact that we were experiencing a slow but steady improvement in business. This has continued, with the result that the latter part of the year covered by this report will be considered, I think, highly satisfactory. We have not reached the point where the directors feel warranted in replacing the common stock on a 6 per cent. basis, they believing that in view of the various features of uncertainty as to the future a conservative policy is best."

British Foundry Exhibition.—The first Foundry Trades Exhibition in Great Britain will be held in the Royal Agricultural Hall, London, England, June 14 to 28. The annual convention of the British Foundrymen's Association will be held in connection with it. American and European foundrymen have been invited to participate and officers of the American Foundrymen's Association have been named as patrons of the exposition.

Production of Structural Shapes, Wire Rods and Nails in 1912

The Bureau of Statistics of the American Iron and Steel Institute has received from the manufacturers complete statistics of the production of iron and steel structural shapes, wire rods, and cut and wire nails in the United States in 1912. For 1911 and all previous years the statistics given below were compiled by the American Iron and Steel Association.

Production of Structural Shapes

The production of beams, beam girders, zee bars, tees, channels, angles, and other forms of heavy and light iron and steel structural shapes in 1912 is separately given below. Prior to 1912 the output of heavy structural shapes was not separated from the output of light structural shapes. In the statistics for 1910 and 1911 the production of small angles, small channels, and other similar light structural forms for use in the manufacture of bedsteads, safes, fences, etc., was not included in the total output of structural shapes, but for 1909 and some prior years the output of light shapes of this character was included.

The figures given for heavy structural shapes for 1912 include all beams, tees, zee bars, angles, channels, etc., having one leg or web of 3 in. and over which were rolled for structural or fabricating purposes, while the figures given for light structural shapes include only light shapes having a section smaller than is provided for in the heavy structural classification. The production of plates, girders made from plates, merchant bars, bars for reinforced concrete work, sheet piling, etc., all of which are provided for elsewhere, are not included.

The total production of heavy and light structural shapes in 1912 amounted to 2,846,487 gross tons, of which 2,470,453 tons was heavy and 367,072 tons was light structural shapes. All the heavy shapes were rolled from steel, while of the light shapes 5517 tons was rolled from iron and 370,555 tons was rolled from steel.

The production of structural shapes since 1909 by States was as follows:

States—Gross tons.	1909.	1910.	1911.	1912.
New York and New Jersey	177,483	1,853,407	1,565,457	1,22,773
Pennsylvania	1,642,074	1,820,033	2,017,583	17,799
Illinoian and Ohio	60,213	40,433	30,773	73,141
Ind., Ill., Wis., Colo., and Cal.	395,792	373,050	316,137	599,729
Total	2,275,562	2,266,890	1,912,367	2,846,487

In 1912 there were 38 works in 10 States which rolled heavy or light structural shapes, as follows: New York, 2; New Jersey, 2; Pennsylvania, 20; Alabama, 1; Ohio, 4; Indiana, 3; Illinois, 3; Wisconsin, 1; Colorado, 1, and California, 1.

The following table gives the approximate annual consumption of iron and steel structural shapes in this country from 1906 to 1912 in gross tons, imports for each year having been added and exports deducted:

Years.	Production of structural shapes.			Add imports.	Deduct exports.	Approximate consumption.
	Gross tons.	Iron.	Steel.			
1906	4,719	2,114,053	2,118,772	28,573	112,555	2,034,790
1907	3,973	1,936,379	1,940,352	2,294	138,442	1,804,204
1908	2,423	1,080,758	1,083,181	3,623	116,881	969,923
1909	41,814	2,230,748	2,275,562	6,146	90,830	2,190,878
1910	426	2,266,464	2,266,890	14,897	146,721	2,135,066
1911	811	1,911,556	1,912,367	5,343	223,493	1,694,217
1912	5,517	2,840,970	2,846,487	3,120	288,164	2,561,443

¹⁹¹² do not include some small forms of rolled iron and steel which were included as structural shapes in 1909 and previous years.

In 1912 over 10 per cent. of our total output of structural shapes was exported, as compared with over 11 per cent. in 1911. Of the structural shapes exported in 1912, 160,932 tons was sent to Canada, as compared with 160,054 tons in 1911.

Production of Wire Rods

The total production of wire rods in 1912 amounted to 2,653,533 gross tons, against 2,450,453 tons in 1911. In 1912 the steel wire rods rolled amounted to 2,652,264 tons and the iron rods to 1289 tons, as compared with 2,449,843 tons of steel and 610 tons of iron rods rolled in 1911. Small quantities of steel copper-clad wire rods are included in the totals for recent years. The maximum production of wire rods was reached in 1912. The year of

next largest production was 1911. The production since 1909 was as follows:

States—Gross tons.	1909.	1910.	1911.	1912.
Mass., R. I., N. Y., and N. J.	280,101	246,669	244,300	238,680
Pa., Ky., Ga., Ala., and Ohio	1,388,237	1,412,352	1,585,973	1,806,720
Indiana, Illinois, and Colorado	667,347	582,809	620,180	588,153
Total	2,335,685	2,241,830	2,450,453	2,653,533

The rank of the producing States in 1912 was as follows: Pennsylvania, Ohio, Illinois, Indiana, Massachusetts, New Jersey, Colorado, New York, Alabama, Kentucky, Georgia and Rhode Island.

Iron or steel wire rods were rolled in 1912 by 36 works in 12 States. In 1912 Pennsylvania rolled over 44.6 per cent. of the total production, against over 41.4 per cent. in 1911. At the close of 1912 one mile was partly built in Alabama.

The following table gives our approximate annual consumption of wire rods from 1906 to 1912:

Years	Production of wire rods,	Add imports	Deduct exports	approximate consumption
Gross tons	Iron	Steel	Total	
1906	1,201	1,870,413	1,871,614	17,799
1907	1,550	2,016,033	2,017,583	17,076
1908	509	1,816,440	1,816,949	11,209
1909	522	2,335,685	2,335,685	10,544
1910	627	2,241,203	2,241,830	20,374
1911	619	2,449,843	2,450,453	15,483
1912	1,289	2,652,264	2,653,533	15,069

Of the exports of iron and steel wire rods in 1912, 63,963 tons was sent to Canada, as compared with 22,583 tons in 1911.

Production of Cut Nails

The production of cut nails and spikes cut from plates in 1912 amounted to 978,415 kegs of 100 lb. each, against 967,636 kegs in 1911.

The following table gives the production by States in 1911 and 1912, iron nails being separated from steel nails for 1912. Machine-made horseshoe nails, cut tacks, wire nails or railroad or other forged iron or steel spikes are not included:

States—Kegs of 100 lb.	1912			1911
	Iron	Steel	Total	
Pennsylvania	179,869	330,935	510,804	559,550
West Va., Mass. & Ohio	280,689	280,689	280,689	286,816
Ky., Ind., Ill., Wis., & Cal.	27,152	159,770	186,922	121,270
Total	207,021	771,394	978,415	967,636

Seventeen works in eight States made cut nails in 1912, against 13 works in six States in 1911. Eight works were idle in 1912.

The following table gives the production by States of cut nails and cut spikes from 1908 to 1912 in kegs of 100 lb.:

States—Kegs.	1908	1909	1910	1911	1912
Pennsylvania	525,169	666,792	537,118	559,550	510,804
W. Va., Mass. & Ohio	285,554	364,947	275,352	286,816	280,689
Ky., Ind., Ill., Wis. & Cal.	145,439	175,858	192,763	121,270	186,922
Total	956,182	1,207,597	1,005,233	967,636	978,415

Production of Wire Nails

The production of wire nails in 1912 amounted to 14,659,700 kegs of 100 lb., as compared with 13,437,778 kegs in 1911. Steel wire nails only were made in both years. The following table gives the output by States from 1909 to 1912:

States—Kegs of 100 lb.	1909	1910	1911	1912
Mass., R. I., Conn.	195,298	175,730	107,740	112,870
N. Y., N. J. and Pa.	6,113,351	5,457,099	6,485,729	7,389,861
Ky., Ga., Ala. and Ohio	3,470,001	3,503,433	3,628,584	3,853,667
Indiana and Illinois	3,449,106	2,906,274	2,637,000	2,670,166
Wis., Colo. and Cal.	688,295	662,366	578,725	633,136
Total	13,916,053	12,704,902	13,437,778	14,659,700

In the following table the annual production, exports and approximate consumption of wire nails are given from 1906 to 1912. Imports are not available, but they were insignificant:

Years—Kegs	Production	Exports	Consumption
1906	11,486,647	1,035,705	10,450,942
1907	11,731,044	945,035	10,786,009
1908	10,662,972	593,819	10,069,153
1909	13,916,053	686,687	12,229,366
1910	12,704,902	960,295	11,744,607
1911	13,437,778	1,200,957	12,236,821
1912	14,659,700	1,530,353	13,129,347

The maximum exports of wire nails were reached in 1912, when 1,530,353 kegs, or over 10.4 per cent. of the total output, was sent abroad.

Approximate Consumption of Cut and Wire Nails

The following table gives the annual production, exports and approximate consumption of cut and wire nails from 1906 to 1912. The annual reports of nails are unimportant:

Years—Kegs of 100 lb.	Cut and wire nails		
	Production	Exports	Consumption
1906	12,675,886	1,205,224	11,470,662
1907	12,840,182	1,100,247	11,739,935
1908	11,619,154	751,138	10,868,016
1909	15,123,650	909,252	14,214,398
1910	13,710,135	1,142,382	12,567,753
1911	14,405,414	1,456,811	12,948,603
1912	15,638,115	1,738,921	13,899,194

Pig Iron by Grades in 1912

First Statistics Separating Molten and Cast Pig Iron—Raw Material Tonnage

The Bureau of Statistics of the American Iron and Steel Institute, which is in charge of William G. Gray, has received from the manufacturers complete statistics of the production of all kinds of pig iron by grades in the United States in 1912. In the following table a comparison is made of these statistics for 1912 with those for the three years preceding, all figures representing gross tons:

	1912	1911	1910	1909
Bessemer and low-phos.	11,664,015	9,409,303	11,245,642	10,557,370
Basic (mineral fuel)	11,417,886	8,520,020	9,084,608	8,250,225
Foundry and ferrosilicon	5,073,873	4,468,940	5,260,447	5,322,415
Malleable Bessemer	825,643	612,533	843,123	658,048
Forge pig iron	469,183	408,841	564,157	725,624
Spiegeleisen	96,346	110,236	153,055	142,831
Ferromanganese	125,378	74,482	71,376	82,209
White and mottled, direct castings, etc.	54,613	45,192	81,159	56,749
Total	29,726,937	23,649,547	27,303,567	25,795,471

It will be seen that while the Bessemer pig-iron output last year increased 2,254,712 tons over that of 1911, the basic output was 2,897,866 tons more. The only falling off was in spiegeleisen, of which 13,890 tons less was made in 1912 than in 1911. The Bessemer figures include low-phosphorus pig iron, that is, iron running below 0.04 per cent. in phosphorus. Pig iron containing from 0.04 to 0.10 per cent. of phosphorus is classified as Bessemer. Ferrosilicon, Bessemer ferrosilicon, electrolytic ferrosilicon and high-silicon pig iron are included with foundry iron. Though the total production of pig iron was over 2,400,000 tons more last year than in 1910 (the previous high record year), the production of foundry iron fell off from 5,260,447 tons in 1910 to 5,073,873 tons last year. Included in the 5,073,873 tons of foundry pig iron reported for 1912 is 104,017 tons of ferrosilicon, Bessemer ferrosilicon and electrolytic ferrosilicon, made in New York, Pennsylvania, Virginia, West Virginia, Kentucky, Ohio and Illinois. Pig iron containing 7 per cent. of silicon and over is classified as ferrosilicon. Nearly all the charcoal iron is classified as foundry pig iron.

Molten and Cast Pig Iron

The form in which the pig iron made in 1912 was cast or was delivered to open-hearth furnaces, mixers, etc., is given below in gross tons:

	Molten	Sand	Machine	Chill	Direct	Total
	condition	cast	cast	cast	cast	
Mass. & Conn.	17,366	.....	.....	.....	.....	17,366
N. Y., N. J., & Md.	918,768	725,911	463,367	87,026	581	2,195,653
Pennsylvania	7,625,333	1,567,511	2,966,429	387,216	5,642	12,552,131
Va., Ala., & West Va.	674,361	1,456,182	225,763	35,201	1,701	2,393,208
Kentucky	.....	68,760	.....	.....	.....	68,760
Tennessee	.....	351,516	.....	6,697	25	338,238
Ohio	3,722,985	1,355,933	1,511,867	209,877	1,831	6,802,493
Ind., Ill., Mich., & Colo.	3,525,275	462,957	1,046,695	.....	802	5,035,729
Wis., Minn., Mo., & Cal.	.....	323,359	.....	.....	.....	323,359
Total	16,466,722	6,309,495	6,214,121	726,017	10,582	29,726,937

Nearly 55.4 per cent. of the pig iron made in 1912 was delivered to steel plants in a molten condition, over 21.2 per cent. was sand cast, and about 23.4 per cent. was machine cast, chill cast, etc.

Consumption of Coal, Coke and Charcoal

In 1912 there was consumed in making the 29,726,937 gross tons of pig iron produced about 35,721,127 net tons of coke, about 47,022 net tons of bituminous coal, about

73,794 gross tons of anthracite coal, and about 35,456,017 bushels of charcoal. The average consumption of coke and bituminous coal per ton of pig iron made with these fuels in 1912 was about 2,436.5 lb.; of anthracite coal and coke mixed, about 565.2 lb. of anthracite coal and about 2,341.6 lb. of coke per ton of pig iron; of anthracite coal alone, about 2,954.7 lb. per ton of pig iron, and of charcoal, about 102.1 bushels per ton of pig iron.

Consumption of Iron Ore, Mill Cinder, Scale, Etc.

The total consumption of domestic and foreign iron ore, ore briquettes, etc., not including mill cinder, scale, scrap, etc., in the manufacture of pig iron in 1912 was about 55,656,000 gross tons, as compared with about 43,980,000 gross tons in 1911. The average consumption of iron ore in 1912 per ton of pig iron made was about 1.82 tons, as compared with about 1.859 tons in 1911. About 850,000 tons of iron ore was also consumed by rolling mills and steel works.

In addition to the 55,656,000 gross tons of iron ore, ore briquettes, etc., consumed in 1912 in the manufacture of pig iron about 4,319,000 tons of mill cinder, scale, scrap, slag, zinc residuum, etc., was also used, as compared with about 3,761,000 tons in 1911. Adding these figures to the ore reported gives a total consumption in 1912 of about 59,975,000 tons, or an average of about 2,017 tons of ore and other metallic material per ton of pig iron made, as compared with an average of 2,018 tons in 1911.

Of the total consumption of ore, mill cinder, scale, etc., by blast furnaces in 1912 about 92.8 per cent. was iron ore, briquettes, etc., and about 7.2 per cent. was mill cinder, scale, scrap, etc.

Limestone Consumed in Making Pig Iron

The limestone, including dolomite, consumed by the blast furnaces in the production of 29,726,937 tons of pig iron in 1912 amounted to 15,092,166 tons. The average consumption of limestone per ton of all kinds of pig iron made was 1137.2 lb. in 1912, against 1144.8 lb. in 1911. The consumption in 1912 by anthracite and bituminous furnaces was 1146.1 lb., against 1153.6 lb. in 1911, and by charcoal furnaces it was 381.6 lb. in 1912, against 405.4 lb. in 1911.

Canadian Pig-Iron Output in 1912

The Bureau of Statistics of the American Iron and Steel Institute has received direct from the manufacturers the statistics of the production of pig iron in Canada in the calendar year 1912. The total, including ferrosilicon, ferrotitanium and ferrophosphorus, was 912,878 gross tons, against 824,368 tons in 1911, an increase of 88,510 tons, or over 10.7 per cent. Of the total 886,506 tons was made with coke and 26,372 tons with charcoal, coke and electricity, etc., against 799,716 tons made with coke and 24,652 tons with charcoal, coke and electricity, etc., in 1911. The production of basic iron was 489,799 tons, against 413,303 tons in 1911; of Bessemer pig iron, 228,742 tons, against 186,274 tons in 1911; of foundry pig iron and ferrosilicon, 104,208 tons, against 100,324 tons in 1911; of malleable Bessemer and white and mottled pig iron, direct castings, ferrotitanium, ferrophosphorus, etc., 129 tons, against 34,467 tons in 1911.

On December 31, 1912, Canada had 19 completed blast furnaces, of which 14 were in blast and 5 were idle. Of the total 15 usually use coke for fuel and 4 use charcoal. One charcoal and two coke furnaces were being built on December 31. In 1912 three plants made ferroalloys in electric furnaces.

The production of all kinds of pig iron in Canada in the last nineteen years is given below. Spiegeleisen, ferromanganese, ferrosilicon, ferrotitanium, ferrophosphorus, etc., are included:

	Tons	Tons	
1894	44,791	1904	270,942
1895	37,829	1905	488,003
1896	60,030	1906	541,937
1897	53,796	1907	581,146
1898	68,755	1908	563,672
1899	94,077	1909	677,090
1900	86,090	1910	740,210
1901	244,976	1911	824,368
1902	319,557	1912	912,878
1903	265,418		

In the ten years from 1903 to 1912 there was but one, 1908, when the production of pig iron in the Dominion did not show an increase over the output of the preceding year. It was not until 1902 that Canada began to develop its steel industry.

Book Reviews

Modern Organization. By Charles DeLano Hine. Pages, 110, $7\frac{1}{2} \times 5\frac{1}{4}$. Published by the Engineering Magazine Company, New York City. Price \$2.

In this little book Major Hine makes a strong plea for common sense, for intelligent direction, in organization and in administration. The author gives a story of his work in reorganizing plans of management on the Harriman Lines and also brings out ideas in correction of over-centralization and over-specialization in government and industrial lines. The book might be sub-titled "The Human Element in Organization." It appeals for the displacement of feudal, rule of thumb, arbitrary systems by common sense plans—for calm dispassionate investigation and for action based upon actual circumstances.

The unit system as used on the Harriman Lines consists of general and divisional organizations of several "assistant general managers," and several assistant superintendents, taking the place and duties of former definitely titled officials such as "superintendent of motive power," etc. The principal advantage secured is that co-operation has taken the place of departmental strife. Each official has come to see that his principal duty is to the company; his interests have been broadened and his authority enlarged. For example, as an assistant superintendent maintenance officials notice and correct obvious mistakes of operating employees, while formerly any suggestion of authority of one department head in another part of the organization was seldom attempted, and when attempted was met with resentment. Rough and ready justice of the police court authority on the spot has displaced friction or involved correspondence.

In succeeding chapters the author takes up over-specialization, the fallacy of a too centralized and too little understood accounting system, the relation of supplies and purchaser, line and staff and the evolution of organization.

The book is an assembly of articles appearing originally in the *Engineering Magazine*, and it is not perhaps surprising to find that the book lacks continuity. Moreover, the book could be made more useful by the inclusion of additional concrete suggestions to individual concerns along the ideas in the chapters. Yet as it stands the book is a sane helpful book by a writer who has kept his conclusions well balanced by experience, and whose theories are of the best in modern organization.

The Motor and the Dynamo, by James Loring Arnold. Pages, vi+178, 6 x 9 in.; illustrations, 166. Published by the Chemical Publishing Company, Easton, Pa. Price, \$1.50.

This book was written by the author, who is professor of electrical engineering in New York University, as the result of many years' experience in presenting the essentials of electrical science to both college students and practical electricians. The substance of laboratory conferences and classroom explanations is embodied, and in every instance the material is based on modern types of machines to the exclusion of models which are not now considered standard.

After a brief introductory chapter and one dealing with the mathematical principles involved in the theory of electrical machinery, the construction of the dynamo with a description of the various parts is given at some length. The operation and characteristics of the direct-current dynamo and motor are discussed in the next two chapters and the two remaining ones are given over to alternating current and its measurement and a discussion of the various types of alternating-current machinery and the apparatus used in connection with them.

Zink und Cadmium (Zinc and Cadmium), by R. G. Max Liebig. Pages, xvi + 598, $7\frac{1}{4} \times 9\frac{1}{2}$ in. Published by Otto Spamer, Leipzig.

This work is one of a series of books of chemical technology, edited by Professor Dr. Ferdinand Fischer. It is exhaustive in its treatment of the subject, covering nearly every possible phase, including extraction from the ores and by-products and giving laboratory analytical methods as well. A table at the end gives a complete list of the zinc producers in the world up to 1911. It is profusely illustrated, having 205 cuts and 10 plates.

Judicial Decisions of Interest to Manufacturers

ABSTRACTED BY A. L. H. STREET

DURATION OF EMPLOYMENT CONTRACTS.—In the absence of agreement for employment for a fixed term, an employee will be presumed to have been engaged from week to week, where his wages are payable weekly. (Georgia Court of Appeals, Webb vs. McCranie, 77 Southeastern Reporter 175.)

IMPLIED WARRANTY OF MACHINERY.—A manufacturer of a machine to be used for a special purpose impliedly warrants that it will do that work. The buyer is entitled to a reasonable time within which to test the machine, to determine whether it complies with this implied warranty. If it does not, he may affirm the contract and recover the damages caused him by the breach of warranty, or he may rescind his purchase, return the machine and recover any payments made on the price. But where defects in the thing bought are such that the purchaser should have discovered them, his failure to do so with reasonable promptness, or any use of the article after its deficiency is discovered, not made for the purpose of testing, waives the right to rescind. Failure to give timely notice to the seller on discovering defects relied on waives any right to rescind the purchase on that ground. (Wisconsin Supreme Court, Kelsey vs. J. W. Ringrose Net Company, 140 Northwestern Reporter 66.)

EMPLOYER'S DUTY CONCERNING TOOLS AND APPLIANCES.—An employer is not liable for a defect in a simple, ordinary tool procured and provided in the ordinary way. It is one of the essential facts to be proved by a workman, seeking to recover on account of a defective tool or appliance, that he did not know of the defect and had not equal means with the employer of knowing of it. As to a simple tool, the opportunities of the workman for knowing of the defect are at least equal to those of the employer. This rule includes all common tools and appliances, such as hammers, wrenches, axes, spades, and ladders. Nor is the employer bound to inspect simple tools furnished to his workmen to discover whether defects appear in the course of their use. (Illinois Supreme Court, Herricks vs. Chicago & Eastern Illinois Railroad Company, 100 Northeastern Reporter 897.)

ACCEPTANCE OF MACHINERY BY BUYER.—When a contract of sale provides that operation of machinery sold shall constitute an acceptance, operation merely to procure information as to existing defects and to determine whether the machine can be operated does not constitute an acceptance. (California District Court of Appeals, Second District, Sherman vs. Ayres, 130 Pacific Reporter 163.)

LOSS OF BUYER'S RIGHT TO RESCIND PURCHASE.—Six weeks' delay by a buyer of goods in repudiating the sale on the ground that the articles purchased did not come up to the sample by which they were sold bars him from rescinding the purchase for that reason. (St. Louis Court of Appeals, Sterling Silver Mfg. Company vs. Worrell, 154 Southwestern Reporter 866.)

EFFECT AND VALIDITY OF CONDITIONAL SALE CONTRACT.—Under the law of Texas, a conditional sale contract reserving title in the seller until payment of the price operates as a chattel mortgage, and, hence, must be recorded. A contract giving a seller of machinery a lien on all machinery bought and to be bought, to secure payment therefor, is void as to machinery in the hands of the buyer when he becomes bankrupt, not bought under such contract. (United States District Court, Northern District of Texas, *in re Raney*, 202 Federal Reporter 996, 1003.)

The Detroit Foundrymen's Association held its annual banquet and election and installation of officers at the Hotel Griswold, Detroit, May 15. W. P. Putman presided as toastmaster. Nearly a hundred members were present. The officers installed are: President, E. B. Horne, Packard Motor Company; vice-president, A. F. S. Blackwood, Michigan Steel Castings Company; treasurer, E. I. Chase, Cadillac Motor Car Company; secretary, William W. Fletcher, American Blower Company. Executive Committee—Henry Johnson, Fairview Foundry Company, Herbert Osborn, Cadillac Motor Company; Edward Bierwitt, Russell Wheel & Foundry Company, and William Christon, Atlas Foundry Company.

The Engineering Construction Company, 106 North LaSalle street, Chicago, announces its organization as engineer and contractor for shaft, tunnel, caisson, bridge, foundation, conduit and concrete construction. Designs will be prepared and plans, specifications, reports and estimates drawn. E. A. Clark is chief engineer of the company; I. J. Crowley, general manager, and James X. Gunning, secretary and treasurer.

S. DIESCHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

The Machinery Markets

Although there are continued reports of lessened buying here and there conditions in general are holding up fairly well and in one or two instances there has been a little improvement. New York is quiet locally but looking forward to railroad and Government business. In New England the scarcity of skilled labor has caused prices of metal planing machines to be advanced, otherwise there is no material change. In Philadelphia most of the sales are for single tools for prompt shipment with railroads doing some of the buying. The outlook has improved in Cleveland, although the volume of new business is moderate; in this city also skilled labor is not easy to get. Orders for standard tools are rather light in Detroit, but there is a somewhat better demand for special types and it is expected that the automobile trade will soon become more active. In Cincinnati shops are operating on full time, but current orders are small and from a wide territory. Conservatism in buying has caused a falling off in the demand for power equipment in Milwaukee, but the shops have plenty of business for the present. In the Central South the demand for all classes of equipment is fair and in some cases better, especially in regard to power machinery. Birmingham conditions are above the average for the season, the demand from the mines being especially encouraging, although machine tools are not as active as last month. In St. Louis business continues rather quiet, although the volume of sales is fair, with good call for second-hand stock. On the Pacific coast some orders are coming out from the larger railroad shops for single machines and there is a feeling that the immediate future will be more active.

New York

NEW YORK, May 21, 1913.

Practically all of the New York trade is figuring on requests from the Navy Department at Washington for bids on a large and varied quantity of machine tools and general equipment for the new navy yard at Pearl Harbor, Hawaii. The expenditures, it is estimated, will total at least \$500,000. The shop requirements which have been made known by several railroads have not yet resulted in much, if any, actual business, and prospective buying continues to be the encouraging feature of the local market. Most of the direct representatives of machine tool manufacturers and several of the dealers say that local conditions continue quiet though some of them have received a few fair miscellaneous orders and in at least one case both new and second-hand tools have been sold for export to France, Cuba and South America.

It is expected that dealers will acquire a major part of the contents of the plant of the Matheson Automobile Company, Wilkes-Barre, that is scheduled to be sold at auction this week by Samuel Freeman & Co., Philadelphia. The days of sale were announced as May 20-23 and the entire plant and property, including 15 buildings, are to be disposed of, the sale of machine tools taking place Thursday and small machine tools on Friday. The plant has been divided into 3000 lots, some of which are subdivided.

The Ashmusen Mfg. Company, Kings Park, Long Island, N. Y., recently incorporated, has been formed to manufacture the Primotor gasoline engine. This is an eight-cylinder horizontal engine for aeroplanes, with tested improvements in the oiling system, connecting-rod design, valves, air cooling scheme and carburetor. The experimental plant of H. W. Ashmusen will be used and such buildings and equipment will be added as needed. No more machinery will be necessary at present. Economy and proficiency will be practiced from the beginning. Engines of this type and only one size, 60-hp., will be manufactured at present, but it is expected to undertake others in time.

Plans have been completed by the Cohoes Company, Cohoes, N. Y., for a powerhouse, 67 x 170 ft., to be constructed on the Mohawk River. The cost of the plant with generating equipment and machinery will, it is stated, be about \$1,100,000. D. H. Van Auken, Cohoes, is superintendent of the company.

The American Car & Foundry Company is building an addition to its plant at Depew, N. Y., near Buffalo, requiring a small amount of structural steel.

The Board of Village Trustees, Mt. Morris, N. Y., has voted to purchase the Mills Water System and to install a supplementary system and improvements which will cost about \$70,000. The water supply will be taken from Silver Lake.

The Salisbury Ball Bearing Mfg. Company is making arrangements to build a plant at Gowanda, N. Y. C. W. Salisbury of the Salisbury Wheel & Mfg. Company, Jamestown, N. Y., is president of the ball bearing company.

The town of Lyons, N. Y., has authorized the issu-

ing of bonds to cover the cost of installing a municipal lighting plant for which Horace G. Sweet, engineer, Utica, N. Y., has prepared plans.

The Albion Water Works Company, Albion, N. Y., has received permission from the State Conservation Commission to construct an 18-ft. dam in Otter Creek and install a filtration plant.

The Rochester Bronze & Aluminum Company, Inc., Rochester, N. Y., has been incorporated with \$25,000 capital stock by P. J. Lembke, Joseph Strauss, John J. Keefe, Rochester, to engage in the manufacture of brass, bronze, iron and aluminum castings.

The Niagara Falls Furnace Company, Niagara Falls, N. Y., has increased its capital stock from \$50,000 to \$100,000, and will build a larger plant than it had originally planned. Building contracts have been let and it is expected the plant will be completed and ready for operation August 1. It will have capacity for the production of 3500 furnaces per year.

The Gerstman Mfg. Company, Buffalo, has completed plans for a two-story factory it will build on Fillmore avenue near Broadway.

The Grimm Mfg. Company, Buffalo, manufacturer of special tools for carpenters' and contractors' use is building a new factory at Gillette and East Delavan avenues and the New York Central Railroad Belt Line.

The Erie Railroad Company will build a new elevator of reinforced concrete with structural steel head house and modern elevating machinery and appurtenances electrically operated on the Buffalo River and Ohio street. The elevator is to be strictly fire-proof in every particular and will replace the elevator which was destroyed by fire last week.

The Foster Machine Company, Syracuse, N. Y., is taking figures for the construction of a two-story factory 37 x 76 ft. to be erected on South West street.

Architect Edward Howard, Syracuse, N. Y., is receiving figures for construction of a foundry building 50 x 76 ft., one story, for A. S. Reddin, 410 Marcellus street, that city.

Huther Bros., saw manufacturers, Rochester, N. Y., are building an addition 69 x 87 ft. to their plant on University avenue.

The Tamarin-Goldstein Company, Inc., Hudson, N. Y., has let a contract for an addition to its furniture factory 46 x 81 ft., three stories and basement.

A two-story and basement factory building, 50 x 200 ft., is to be built at North Tonawanda for the Fahnstock Company, Philadelphia, manufacturer of candy, lessees, by the Sweeney Industrial Properties.

The United Box Board Company, Thomson, N. Y., has let a contract for the erection of a one-story mill 40 x 150 ft.

Yund, Kennedy & Yund are receiving bids for an addition, two stories and basement, to their knitting mill at Amsterdam, N. Y.

Work is under way on an addition to be made to the Struthers-Wells Company, Warren, Pa., to be used for a flanging and forge shop.

The United States Printing & Lithographing Company, Erie, Pa., is completing plans for a four-story factory which it will build this summer at a cost of \$100,000. J. R. Low is manager.

Catalogues Wanted

The Bureau of Insular Affairs, office of the Purchasing Agent for the Government of Porto Rico, has issued a request for catalogues and discount sheets to be placed in the files of the Government Auditor at Porto Rico. All such matter should be carefully addressed: Paul S. Carter, P. A., 17 Battery place, Room 1530 Whitehall Building, New York City, N. Y. (For Auditor of P. R.) All letters on the subject must be in triplicate.

New England

BOSTON, MASS., May 20, 1913.

Manufacturers and dealers report the week as indicating no material change in demand. Builders of metal planing machines have advanced their prices somewhat, the change being attributed to the increased cost of labor.

The Russell Mfg. Company, Greenfield, Mass., has been incorporated under a Massachusetts charter and will manufacture an improved line of screwplates, taps, dies and other small tools, and machinery. Whitman Russell is the president of the company, Charles C. Russell vice-president and treasurer, with Lucius D. Potter as the third director. H. J. Smith will be the superintendent. A factory will be built in or near Greenfield, Mass., 75 x 140 ft., and the production of goods will begin at the earliest possible date. Charles C. Russell was for years general manager of the Wiley & Russell Mfg. Company, Greenfield, and Whitman Russell, the superintendent. Both retired April 1, 1912, when the controlling interests in the Wiley & Russell Company and the Wells Bros. Company were acquired by the Greenfield Tap & Die Company.

Plans have been completed for the new factory of the Hartford Special Machinery Company, which will be erected on Woodland street, Hartford, Conn. The structure will be 63 x 190 ft., three stories, with stair and elevator towers, and will be constructed of reinforced concrete.

The Thomas Barrett Company, Hartford, Conn., will build a woodworking shop 35 x 40 ft.

The Excelsior Hardware Company, Stamford, Conn., will build a factory 50 x 78 ft., one story.

W. A. Kinne, New Britain, Conn., will build a brass foundry, consisting of a two-story section 40 x 67 ft., and a one-story section 40 x 40 ft.

The Greenfield Electric Light Company, Greenfield, Mass., will erect a new power house in the neighboring town of Shelburne Falls.

The C. F. Church Mfg. Company, Holyoke, Mass., manufacturer of plumbing specialties, will build a factory at Willimansett, Mass., 40 x 225 ft., one story.

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., will build a power house 20 x 60 ft., of brick and concrete.

The Pequonnock Foundry Company, Bridgeport, Conn., will build a one-story addition to its plant 40 x 62 ft.

Additions to general manufacturing industries of New England include the following: Indian Orchard Company, Indian Orchard, Mass., additional factory 60 x 200 ft., one story; Eaton-Dikeman Paper Company, Pittsfield, Mass., rearrangement and enlargement of mills; L. E. Hilliard, Waterville, Me., shoe factory; Hedges Fiber Carpet Company, Indian Orchard, Mass., additional story.

Philadelphia

PHILADELPHIA, PA., May 20, 1913.

Purchases have been almost entirely confined to single tools, sales frequently being dependent on ability of the seller to make prompt shipment. Orders for a few odd tools are being received from the railroads, but there has been no general buying against recent large inquiries. While new business comes out slowly no cancellations of orders previously placed for machinery are noted. A slightly larger volume of inquiry for boilers and engines has developed, particularly for moderate capacity equipment. Second-hand machinery merchants report business quiet. The demand for electric cranes is practically at a standstill in this district. Export trade is quiet. Foundry operations, particularly in steel castings, continue on about an even basis. Some of the gray iron founders have been interfered with by labor troubles, but the difficulty is now general.

Sauer & Hahn, architects and engineers, are taking estimates on the construction of a cold storage and packing plant to be erected at 712 South Second street

for Sklaroff & Sons. Bids are being asked on boilers, engines, refrigeration and other machinery identified with the packing business. The building is to be equipped with a heating system and elevators.

It is stated that the Ford Motor Company has purchased from the Haney-White Company a plot of ground 370 ft. on Broad and 231 ft. on Lehigh avenue, irregular in shape. It is reported the purchasers propose to erect a large building for assembling automobiles and for salesroom purposes.

The Hall & Taylor Company, 232-234 Ionic street, has been incorporated with a capital stock of \$25,000 under New Jersey laws, to take over the business of the company, operating under the same name. The company designs and manufactures automatic and special machinery and also has a department for the manufacture of fine tools and dies. It will be adding new equipment from time to time. William E. Taylor is treasurer.

The Haverford Cycle Company, 827 Arch street, is having plans prepared by Peuchert & Wunder for a four-story brick building, 824-826 Cherry street, to be used as a repair shop and warehouse. Details as to the power equipment have not been decided upon. When the building is completed the necessary machine tool equipment for repair work will be required.

Justice Cox, Jr., & Co., Land Title Building, is in the market for a 60 or 70 ton Shay locomotive for delivery in West Virginia.

Contractors are estimating on a new one-story garage building 95 x 115 ft., to be erected at North and Bouvier streets as a station for delivery service automobiles for Lit Brothers.

E. F. Houghton & Co. have placed a contract for the construction of a new power house at 240 West Somerset street. Bids are going in on two boilers. The type of engine and generator to be installed will be decided on this week.

Chicago

CHICAGO, ILL., May 20, 1913.

The Devoe & Reynolds Company, Chicago, will build at 711-13 West Chicago avenue a three-story brick factory the estimated cost of which is \$35,000.

The Chicago & Alton Railroad has awarded to Westinghouse, Church, Kerr & Co., New York, contracts covering the erection of its new machine shops at Bloomington, Ill.

The Cribben & Sexton Company, Chicago, have taken out a building permit providing for the erection of a three-story factory addition the proposed cost of which is \$26,000.

The Dean Engine Company, Chicago, has been incorporated with a capital stock of \$10,000 to build engines and motors. The incorporators, in addition to George A. Chritton, attorney, 140 South Dearborn street, are N. B. Dearborn and D. C. Thorsen.

The Chicago, Burlington & Quincy Railroad has begun the laying out of new yards near Aurora, Ill., to cost \$700,000, in connection with the extensive improvements in its trackage through that city and will also make some changes in its shop arrangements.

The Stover Mfg. Company, Freeport, Ill., has let the contract for a one and two-story brick addition, 77 x 400 ft., to its plant and to cost \$40,000.

The M. J. Ryan Shoe Company, Joliet, Ill., has been incorporated with \$31,000 capital stock, by Nicholas W. Box, Michael J. Ryan and James W. Hartney, to equip a plant for the manufacture of shoes.

The Farmington Tool Company, Farmington, Ill., with \$25,000 capital stock, has been incorporated by Walter S. Harbert, Charles C. Lane and Walter L. Phillips and will equip a plant for tool manufacture, it is announced.

The Peoria Trusswall Stone Mfg. Company, Peoria, Ill., with \$25,000 capital stock, has been incorporated by C. P. Burt, Robert Hill and Fred E. Maple and will equip a plant for the manufacture of artificial stone.

The Ottawa Stone & Sand Company, Ottawa, Ill., with \$30,000 capital stock, has been incorporated by H. L. Hossack, H. C. Wiley and Clarence Griggs, and will equip a stone and sand production plant.

William Rumely, LaPorte, Ind., has acquired what is known as the Patten factory at Sycamore, Ill. The plant and machinery will be rehabilitated and operated as the Illinois Thresher Company. Mr. Rumely was formerly vice-president of the M. Rumely Company.

The Chesapeake & Ohio Railroad has let the contract for the rebuilding of its shops at Peru, Ind., which were recently destroyed by fire.

The Dubuque Boat & Boiler Works, Dubuque, Iowa,

whose plant was destroyed recently by fire, is rebuilding the new plant, having a ground area 32 x 227 ft. Damage to machinery will necessitate considerable replacement. A total expenditure of \$25,000 is contemplated.

The Northwest Reed & Rattan Works will build a four-story factory at Minneapolis, the cost of which is estimated at \$50,000.

The F. A. Patrick Company, Duluth, Minn., is building a three-story knitting mill to be 140 x 200 ft., of fireproof construction, and to cost \$100,000.

The Des Moines Water Company, Des Moines, Iowa, is planning to expend \$75,000 this spring in improvements and extensions of its facilities.

John W. Chamberlain, Fargo, N. D., has organized a company with a capital stock of \$20,000 for the purpose of manufacturing and developing the sale of a patented wrench designed by himself.

Cincinnati

CINCINNATI, OHIO, May 20, 1913.

Present indications are that the difficulties existing between the Building Construction Employers' Association and the Building Trades Council will soon be settled, and that building work will soon be resumed. Cincinnati was in the throes of a street car strike all of last week, and, with practically all service suspended, many manufacturers had to operate shorthanded the first part of the week. However, auto trucks were requisitioned later, thus enabling almost all employees to report on time. The machine tool trade is drifting along, with some improvement reported from several local builders. All shops are operating on full time, but present orders are small, coming from customers scattered all over the country.

Work will soon commence on the two-story concrete factory building to be erected at 115 West Second street for the Crescent Tool Company, Cincinnati. Mention of this was made sometime ago.

The Burkett Agricultural Works Company, Columbus, Ohio, has been reorganized and changed its name to the Burkett Mfg. Company. It is stated that some extensions to the company's plant will be made at an early date.

The Ahrens Iron Works Company, Cincinnati, has gone into voluntary bankruptcy. Louis J. Dauner was appointed receiver. It is generally believed that the company's financial difficulties will be tided over in a short time.

The Dayton Pipe Coupling Company, Dayton, Ohio, has increased its capital stock from \$50,000 to \$200,000, and in the near future will probably add to its manufacturing facilities.

The American Tank & Pump Company, Cincinnati, has been incorporated with \$10,000 capital stock, to manufacture self-measuring tanks and other specialties. The incorporators are A. C. Davis, P. E. Studebaker, W. F. McCloud, Amos Lint and J. B. Davis.

The National Sparstone Company, Hartman Building, Columbus, Ohio, has been organized and will erect a plant on West Spring street, to be used in the manufacture of a patented composition stone.

The Kilbourne & Jacobs Mfg. Company, Columbus, Ohio, have tentative plans under way for two large additions to their plant. No details will be available for several months yet.

The Columbus Machine & Tool Company, Columbus, Ohio, now has its new plant in full operation.

The John Brown Mfg. Company, Columbus, Ohio, has acquired a large location on Marion road, on which it will build an additional factory for the manufacture of automobile lamps.

Sealed bids will be opened June 26 by Howard B. Hole, clerk, city of Greenville, Ohio, for the following: One combination pumping and chemical engine, hose car and motor fire apparatus, one triple combination motor fire engine, with chemical tank, hose, etc.

The Black Fork Company, Black Fork, Ohio, near Portsmouth, has commenced preliminary work on a vitrified sewer pipe plant. No equipment will be needed at present.

The C. W. Raymond Company, Dayton, Ohio, reports the recent receipt of two large orders from Canada for clay-working and brick-making machinery.

The National Lathe Company, Batavia, Ohio, has been incorporated with \$10,000 capital stock to manufacture lathes and other machine tools. The incorporators are A. V. Carroll, John F. Hartman and Augustus Carrier.

The St. Mary's Machine Company, St. Mary's, Ohio,

has increased its capital stock from \$15,000 to \$250,000. The company manufactures internal combustion engines.

The Tenacity Mfg. Company, Reading, Ohio, whose proposed plant extensions were recently mentioned, has increased its capital stock from \$100,000 to \$150,000.

Cleveland

CLEVELAND, OHIO, May 20, 1913.

In the opinion of dealers the outlook in the machinery trade is considerably better than a few weeks ago. In actual orders only a moderate volume of business is coming out, which is mostly in single tool orders. More small machine shops that require around a half dozen tools are starting up in this territory than for some time. There is still a hesitancy among some larger concerns about placing orders for needed equipment but there seems to be an improvement in the feeling about future business conditions, and the continued activity of manufacturing plants in general is having the effect of quieting some of the pessimistic talk that has appeared recently. Some manufacturing plants are hampered by the scarcity of common labor, and some manufacturers are having trouble in securing skilled labor of various kinds. The demand for heavy machinery is not active, but mining machinery is selling well and some good business in water wheels is in prospect. Not many large industrial projects are coming out. The demand for industrial cars and locomotives is good. In electrical lines there is some call for small units but not much in prospect in the way of large installations.

The city of Cleveland, through W. J. Springfield, director of public service, will receive bids May 27, for electrical equipment for the municipal lighting plant. These will include one 150 kw., 125 volt, direct current steam turbo exciter set, one 150-kw. motor generator exciter set, and two 300-kw., 250 volt, 3-phase, 60-cycle rotary converters with switch boards and transformers. Bids will also be received for one 40-ton motor electric traveling crane, with one 5-ton auxiliary for the lighting plant.

The city of Akron, Ohio, will receive alternate bids May 23, for one vertical triple expansion pumping engine with a capacity of 15,000,000 per 24-hrs. and for two turbine driven centrifugal pumping units, each with a similar capacity. The contract for one of the two types of equipment will be placed by R. M. Pillmore, director of public service.

The Metal Shop Mfg. Company recently established a plant at 1260 West Fourth street, Cleveland, Ohio, for the manufacture of garbage cans, flour cans and other specialties for the hardware trade. Other products include safety deposit boxes. The company finds that its present floor space is inadequate and as soon as suitable quarters are decided upon will move to a new site that will enable it to double its present capacity. Its officers are E. G. Crisswell, president; J. C. Sparrow, vice president; George T. Bauder, secretary, and W. D. Tengler, treasurer.

The Pittsburgh Plate Glass Company will shortly begin the erection of a large addition to its window glass factory at Mt. Vernon, Ohio.

The F. Zimmerman Company, Cleveland, maker of picture frames and moldings, has purchased a site for a large two-story brick, steel and concrete factory building at West One Hundred and Tenth street and Berea Road. The new plant will take the place of one now located on Leonard avenue. Its erection may be deferred until next year.

The Firestone Tire & Rubber Company, Akron, Ohio, will add to its present plant a one-story steel and brick building 72 x 138 ft., which it is stated will be used for a boiler room and for the installation of special machinery.

The Salem Tool Company, Salem, Ohio, will enlarge its plant by the erection of a one story building about 40 x 115 ft. Some new machinery will be installed.

A new machine shop will be established in Delaware, Ohio, by A. F. Stimmel.

The Ohio Road Machinery Company, Oberlin, Ohio, will increase the capacity of its plant and has increased its capital stock from \$10,000 to \$40,000. The company has purchased the building formerly occupied by the National Metallic Packing Company, to which additions will be made as needed. This will be used in connection with its present plant.

The Holderman Machine Company, Toledo, Ohio, maker of special machinery, has leased new quarters in the Toledo Factories Building.

The Gordon Rubber Company, Canton, Ohio, will

erect two new factory buildings. They will be one story brick structures, one 40 x 165 ft. and the other 40 x 200 ft. A power plant will be installed. The company makes druggist's rubber goods, automobile tires and rubber specialties. Its main plant is now located at Beach City, Ohio.

The Monarch Aluminum Ware Company, Cleveland, has been incorporated with a capital stock of \$15,000 by Raymond Deutsch and others, who recently established a plant for the manufacture of aluminum ware.

The Lewis File & Rasp Company, Massillon, Ohio, has been incorporated with a capital stock of \$15,000 by David D. Lewis and others.

Wheeling

WHEELING, W. VA., May 20, 1913.

The Klots Throwing Machine Company, Keyser, W. Va., has been chartered with a capital stock of \$5,000, to manufacture cotton, felt and other fabrics. The incorporators are: Frederick Hildebrandt, Tompkinsville, N. Y.; Hugh L. Nehring, Lauren Carroll, Francis M. Watrus, New York, and John C. Grier, Brooklyn, N. Y.

The water works and sewerage board of Clarksburg, W. Va., contemplates enlarging the city filtration plant at a cost of \$40,000.

The Cleveland-Kingwood Coal & Coke Company, Kingwood, W. Va., has been incorporated with \$250,000 capital stock by J. H. Orgill, F. M. Brady, Carl Huett, T. A. Fleming and W. B. White, all of Cleveland, Ohio.

The Eagle Lubricant Mfg. Company, Canton, Ohio, has been incorporated with \$25,000 capital stock, by John W. Willis, Jeriah Schoneman, Mary A. Schoneman, Joseph N. Willis and P. M. Snyder, all of Canton, Ohio.

The Camp Glass Company, Huntington, W. Va., has been incorporated with a capital stock of \$45,000, to manufacture window glass and general glassware. T. W. Camp, of Smethport, Pa.; John C. Todd, of Mt. Vernon, Ohio; H. A. Zeller, B. C. McComas, George J. McComas, of Huntington, W. Va., are the incorporators.

Two brick buildings, one 60 x 200 ft. and the other 60 x 60 ft., are being constructed at Charleston, W. Va., for the Sparks Drilling Jar Company.

H. O. Feederle, of Akron, Ohio, will build a plant at Clarksburg, W. Va., to manufacture glass reflectors by a secret process.

The Potts Drilling Company, Huntington, W. Va., has been incorporated with \$10,000 capital stock. A. P. Gibson, of Willowood, Ohio; M. A. Motes, H. S. Potts, F. B. Bouldin, J. G. Ramsey, of Huntington, are the incorporators.

Detroit

DETROIT, MICH., May 20, 1913.

Current business the past week in standard tool lines has been rather quiet, and orders have been for small lots only. In special machinery and equipment the demand has been somewhat better and several new propositions involving handling equipment are before the trade. The announcement of large extensions to two local automobile plants is of interest and gives rise to the expectation that the automobile industry generally will become a more active purchaser. The disposal of the equipment of a number of concerns in the metal working trades lately at receiver's sale has placed a large amount of second-hand machinery on the market, and buyers are picking up some good bargains. Conditions are rather easier in the foundry trade, although the demand for steel castings is holding up strongly. Activity continues in building circles and equipment on some large office building and hotel projects is expected to come before the trade in the near future.

Announcement has been made by the Ford Motor Company, Detroit, of plans for additions to its local plant which will, it is said, nearly double its capacity. The plans call for the erection of the two new manufacturing buildings, each 60 x 900 ft. in dimension, and six stories. Two craneways, each 40 ft. wide and of equal length with the buildings, will be constructed to facilitate the transfer of materials in process of manufacture. In addition to the extension to the factory, the company's local service station will also be greatly enlarged. The new buildings will be of reinforced concrete construction of the same type as the present plant.

The Paige-Detroit Motor Car Company, Detroit, has broken ground for an entirely new plant, consisting of a manufacturing building, stock buildings and power

plant. The main building will be 60 x 406 ft., three stories, and the stock building 94 x 94 ft., both of steel and concrete construction. The buildings will be equipped with a battery of elevators and a complete sprinkler system. The new plant, which is on McKinstry avenue, will have its own trackage facilities connecting with two railroads.

The Huron Radiator & Lamp Company, Detroit, has been incorporated with \$30,000 capital stock to manufacture automobile radiators, lamps and other accessories. The principal stockholders are Malcolm T. Faulkner, William Lavin and Mark W. Lavin.

The Michigan Pouring Block Company, Detroit, has been incorporated with \$10,000 capital stock by Enos J. Burke, Davis McIntyre and others. The new company will engage in the manufacture of cement products.

The Blaugas Company, Detroit, has been incorporated to manufacture bottle liquefied gas to supply individual gas plants. The company plans to erect and equip a factory. Among those interested are Charles P. Shaw, S. W. Curtiss and Orla B. Taylor.

The plant of the Detroit Tobacco Company, Detroit, was destroyed by fire May 10, entailing a loss estimated at \$5,000. The company manufactures tobacco products and show cases.

The Michigan Cash Register Company, Detroit, has changed its name to the Michigan Machine Company and will add the manufacture of automobile accessories to its present line of products.

The capital stock of the Detroit Copper & Brass Rolling Mills, Detroit, has been increased from \$2,000,000 to \$2,500,000.

The Detroit Valve Company, Detroit, has been incorporated with a capital stock of \$100,000 to deal in tools and factory supplies. The principal stockholders are F. D. Harrison and George Graham.

The Chelsea Screw Products Company, Detroit, has been incorporated with \$18,000 capital stock to manufacture bolts, nuts and kindred products. C. Lehman and M. J. Dunkle are the principal stockholders. The new company has secured a factory and will install the necessary equipment at once.

Owing to increasing business the plant of the Ypsilanti Reed Furniture Company, Ionia, Mich., will be enlarged by the building of two additional stories, doubling the capacity of the factory. Additional wood-working machinery will be installed.

The Champion Power Sprayer Company, Pontiac, Mich., recently organized, has begun the erection of its factory, which will be of cement construction, 50 x 200 ft., and two stories. In addition to the sprayers, gasoline engines will be manufactured.

The Romeo Foundry Company, Romeo, Mich., is preparing to double the capacity of its branch plant at Port Huron, Mich., and to this end has acquired additional factory quarters 50 x 150 ft. and two stories.

The Ionia Pottery Company, Ionia, Mich., has begun the erection of a two-story brick addition to its plant.

The Kalamazoo Paper Box Company, Kalamazoo, Mich., has acquired the business of the Inman Box Company, of the same city, and will merge the two plants and install additional equipment.

The Reed Mfg. Company, Kalamazoo, Mich., has merged its business into a stock company with \$100,000 capital stock, under the style of the Reed Foundry & Machine Company, and will enlarge its operations. The company manufactures agricultural implements.

The Emergency Forge Company, Lansing, Mich., manufacturer of drop forgings, has increased its capital stock from \$50,000 to \$100,000.

The Acme Metal Company, Chicago, is removing its business to Manistee, Mich., and will occupy the plant of the defunct Manistee Watch Company. The company manufactures gas and electric fixtures.

The Paper Makers Chemical Company, Kalamazoo, Mich., is having plans prepared for the erection of its new plant, which will be 105 x 268 ft., three stories. The concern is a branch of the C. K. Williams Company, Easton, Pa.

The plant of the Hanselman Candy Company, Kalamazoo, Mich., was damaged by fire May 11 to the extent of \$75,000. Steps will be taken at once to resume operations.

George Raviler, Plymouth, Mich., will establish a canning factory in that city.

The Motor Wagon Company, Detroit, automobile manufacturer, has filed a voluntary petition in bankruptcy and the Union Trust Company has been named as receiver.

The Fisher Body Company, Detroit, automobile body manufacturer, has increased its capital stock from \$50,000 to \$1,600,000. A portion of the funds derived from the new stock will be used in equipping the six-story building which the company is completing to

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house its limousine department and in erecting and equipping a new five-story building in which open bodies will be manufactured. The buildings will be 160 x 176 ft. and 112 x 120 ft. respectively, and will be of mill construction. A large amount of new equipment will be installed.

The Wahl Motor Company, Detroit, has been incorporated with \$85,000 capital stock to manufacture automobiles. The principal stockholders are A. M. Dodge and W. J. Hickesch.

Milwaukee

MILWAUKEE, WIS., May 19, 1913.

The wave of conservatism that has taken hold of the country since the terms of the schedules in the proposed Underwood tariff bill were made public, has shown itself in this district and orders are not coming as freely as formerly. The situation, nevertheless, is satisfactory, as there are enough orders on the books to keep the works running far ahead, and it is expected that by the time the shops catch up with the business in hand there will be a resumption of the usual conditions. The conservatism is not so apparent in the machine tool trade as in power equipment, in which there has been a marked falling off so far as new business is concerned.

Frederick W. Kraus, Wausau, Wis., was awarded the structural contract for the new brewery to be erected by the Wausau Brewing Company at \$44,500. Equipment of all kinds is now being purchased under the direction of Nicholas Vesser, Wausau, architect. The total cost will be in excess of \$90,000.

The F. Blocki Company, Sheboygan, Wis., recently mentioned as planning the building of a new plant, will soon be in the market for one 24-in. lathe, one screw cutting machine and one drawing press, 5 or 6 in. stroke.

The Berlin Machine Works, Beloit, Wis., manufacturing sawmill and woodworking machinery, will build an addition, 275 x 294 ft., one and two stories, of steel and brick construction, with sawtooth roof, strictly fire-proof throughout. Plans have been completed by Perkins, Fellows & Hamilton, architects, 6 North Clark street, Chicago.

The Milwaukee-Western Fuel Company, Milwaukee, has been granted a permit to build a twin hoisting apparatus, derrick, etc., at Sixteenth and Canal street docks, to replace the dock destroyed in 1911. Heyl & Patterson, Pittsburgh, are the erectors.

The Wisconsin Aluminum Foundry Company, Manitowoc, has awarded the construction contract for its new foundry plant to Georgeson & Schneider, of Manitowoc at \$22,400. The equipment will entail a further expenditure of \$25,000.

Charles E. Miller, I. M. Stauffacher and A. L. Noel, representing local capital at Monroe, Wis., have organized the Invincible Metal Furniture Company, capital stock \$20,000, to engage in the manufacture of vaults, fireproof cabinets, surgical appliances and other devices. The company will occupy the former Monroe Mfg. Company plant, which has been idle for a year. Only a small list of equipment will be required at the beginning of operations.

The Harley-Davidson Motor Company, Milwaukee, Wis., manufacturing motorcycles, has awarded contracts for the construction of factory No. 8, 60 x 83 ft., six stories, with 12 ft. basement, of steel and concrete. It will be used for general machine shop purposes and the company will require a miscellaneous list of tools and a 6000 pound elevator.

The Monarch Boiler Arch Company, Milwaukee, with a capital stock of \$25,000, has been organized by I. McC. Bean, president of the Milwaukee Boiler Company; Willett M. Spooner and Charles B. Quarles.

Clarence Knapp, of Beaver Dam, has purchased a half interest in the Schley Mfg. Company, Beaver Dam Junction, manufacturing steel tanks, harrows, and other implements. The company intends to extend its activities and will build an addition in the middle of summer.

W. R. Taylor, 2827 Washington avenue, Racine, Wis., is equipping a shop for the manufacture of hinges for screen and wood doors, designed and patented by M. Klein and C. Heater.

Paul, Oscar and Elmer Klumb, Sheboygan, Wis., have broken ground for a factory building, 80 x 150 ft., two stories, for the manufacture of gasoline engines. Paul Klumb is secretary of the Globe Foundry & Machine Company of Sheboygan, successor to the Phillip Meyer Company, of which he had been president.

The Common Council of Kenosha is investigating the cost of establishing a complete filtration plant in connection with the municipal waterworks system at a cost of approximately \$35,000. Daniel O. Head is

mayor and M. J. Brennan is superintendent of waterworks.

Priebe Bros., Antigo, manufacturing cornice, ornamental sheet metal work, etc., are erecting a new factory building 44 x 80 ft., two stories.

The Heller Piano Company, Milwaukee, Wis., will remove to Evansville, Ind., it is reported, and will enlarge its plant considerably.

The Globe Iron Works, Appleton, Wis., may be leased or purchased by a Minneapolis concern, recently organized by F. A. Gehring and J. C. Martin, and turned into a plant for the manufacture of automobile and motor truck accessories. The iron works will be sold at public auction in a few weeks.

The Merrill Iron Works, Merrill, Wis., is completing important improvements to its works whereby the capacity will be considerably increased. The company has discontinued its large garage and repair shop, conducted as part of the plant, so that it may devote its entire attention to manufacturing.

The Hans Motor Equipment Company, La Crosse, which is preparing to build a new plant costing about \$35,000, is now making contracts for equipment. Construction work will begin June 1.

Indianapolis

INDIANAPOLIS, IND., May 20, 1913.

The Swartz Electric Company, Indianapolis, which recently increased its capital stock to \$150,000, will construct two additional factory buildings of steel and reinforced concrete.

The Charles E. Benefiel Company, Indianapolis, has been incorporated with \$15,000 capital stock, to manufacture metal and other novelties. The directors are Charles E. Benefiel, Samuel W. Templeton and Arthur C. Burrell.

The Standard Railroad Supply Company, Indianapolis, has been incorporated with \$10,000 capital stock, to manufacture and deal in railroad supplies. The directors are Ernest H. Tripp, L. P. Newby and John R. Ward.

The Auto Headlight & Oscillator Company, Indianapolis, has been incorporated with \$50,000 capital stock, to manufacture automobile lamps and other accessories. The directors are C. R. West, C. F. Gordon and N. E. Carter.

The Hoosier Mfg. Company, Newcastle, Ind., has increased its capital stock from \$95,000 to \$750,000.

The Kokomo Steel & Wire Company, Kokomo, Ind., has authorized an issue of \$150,000 preferred stock.

The Concrete Construction Company, Nappanee, Ind., has been incorporated with \$10,000 capital stock, to manufacture brick, tile, blocks, etc. The directors are W. H. Birthwhistle, C. A. Burbank and Otto Emmons.

The contract to rebuild the railroad shops of the Chesapeake & Ohio Railroad, at Peru, Ind., recently burned, has been awarded to the Churchill Construction Company, Cincinnati.

The Railway Motor Car Company, Marion, Ind., has increased its capital stock from \$200,000 to \$500,000.

The Newton County Stone Company, Kentland, Ind., has been incorporated with \$15,000 capital stock to crush stone. The directors are W. T. McCray, F. W. VanNatta and William Darroch.

The New Albany Veneering Company, New Albany, Ind., has increased its capital stock \$200,000.

The VanAuken Electric Car Company, Connersville, Ind., has been incorporated with \$10,000 capital stock, to manufacture automobiles. The directors are C. C. Babcock, B. D. Millard and H. M. Wylie.

The Central South

LOUISVILLE, KY., May 20, 1913.

Business conditions are reported by machinery manufacturers and dealers to be fair or better, the general status being considered satisfactory after the quiet trade of last month. There is a good movement in almost every class of equipment, power machinery, including electrical equipment, having the call. Woodworking machinery is in good demand, and elevators and other conveying machinery seem to be selling somewhat better than usual, building activity opening up in earnest. A more or less significant development in this line, however, was the announcement of Theodore Ahrens, president Standard Sanitary Mfg. Company, that the nine-

story reinforced concrete warehouse which was to have been built here, will not be erected for the present, business conditions not justifying expansion at this time, according to the views of the company.

Brinton B. Davis, architect for the six-story reinforced concrete warehouse of Wright & Taylor, Louisville distillers, advises that three electrically operated elevators will be installed in the building, two for freight and one for passenger service. A bottling department also will be equipped in the same structure.

Eberts & Bros., Jeffersonville, Ind., flour millers, have decided not to rebuild the mill which was destroyed recently, but will put up a large warehouse in Louisville. Elevators and other equipment will be needed, but no milling machinery.

The Commissioner of Fisheries has announced that bids will be opened at his office in Washington, D. C., June 4, on the construction and equipment of the pumping house to be located at Louisville.

The American Metallic Packing Company, Lexington, Ky., is asking for prices on a lathe, 42 to 50-in. swing, second-hand.

The H. M. Page Log & Lumber Company, Lexington, Ky., has been incorporated with \$25,000 capital stock and will erect a sawmill. The incorporators are H. M. Page, L. M. Moore and L. G. Strode.

The Roettger-Moore Lumber Company has been formed at Lexington, Ky., with \$10,000 capital stock, and will build a planing-mill. Fred J. Roettger, Thomas J. Moore and Everitt Roettger are the stockholders of the company.

The Louisville & Nashville Railroad Company, general offices in Louisville, has acquired land on which to erect large shops and terminals at Lexington, Ky.

The power plant and factory of the Louisville Box & Basket Company at Thirty-fifth and Bank streets were burned May 15, with a loss of \$15,000. Decision as to rebuilding is to be made shortly.

A site has been secured for the erection of the pumping station for a water-works plant in Paintsville, Ky. The mayor can advise as to the concern which will build and operate the system.

The North Fork Coal Company, Hazard, Ky., will begin work at once in the development of its mining property near that city. The company has been incorporated with \$10,000 capital stock. E. L. Speaks is general manager, and will be in charge of the purchase of equipment.

The Kentucky Utilities Company will install a 100-kw. three-phase generator and one 50-kw. generator for its power-house at Elizabethtown, Ky. The General Electric Company will furnish the equipment.

The saw and flour mill of Wallace Wimberly, Mayfield, Ky., was burned recently with \$10,000 loss.

The Magnet Coal Company, Four-Mile, Ky., has purchased a 150-kw. 250-volt direct-current engine type generator from the James Clark, Jr., Electric Company, Louisville. The generator will be direct connected to a Skinner engine, which was bought direct.

The Heuser Coal Company, Roanoke, Va., has taken over a 300-acre tract of coal land near Mayking, Ky., and will proceed at once to install machinery and develop the property.

C. S. Kirk, Maysville, Ky., is purchasing equipment for a syrup factory to be installed at Salisbury, N. C. and is in the market for a 6 hp. boiler, 6 hp. motor, steam jacket copper kettle, etc.

Cogar, Rumley & Co., Midway, Ky., will be in the market shortly for power and conveying equipment for a new grain elevator, the contract for the building having just been awarded. The capacity of the elevator is 20,000 bushels.

The flour mill of Thomas Mattingly, Lebanon, Ky., was partially destroyed by a boiler explosion May 10. The equipment will be replaced at once.

George N. Welch, T. E. Goff and J. T. Price, Monterey, Tenn., have a franchise for an electric-light plant, which they will build at once at a cost of \$5,000.

The Hale Buggy Company, Anniston, Ala., has decided to increase the capacity of its plant and is increasing its capital stock.

The Hattiesburg, Miss., Traction Company will install a 1500-kw. turbine engine in its power plant.

The Bridgewater, Va., Superior Plow Company, is beginning the erection of a new factory building. It is to be of brick, two stories, 30 x 125 ft. Machinery for the plant will be purchased shortly.

A planing mill of the Greene County Lumber Company, Mobile, Ala., was burned recently with a loss of \$50,000.

J. Schwarzwald & Sons, beer coopers, Louisville, Ky., will be in the market in the near future for cooperage machinery of various kinds. Arthur Herb is general manager of the company.

Birmingham

BIRMINGHAM, ALA., May 19, 1913.

Conditions are above the average for this season. Additional mining developments have created a demand for boilers, pumps and engines. Machine tools are not as active as last month. Business on the whole continues satisfactory, especially with the larger dealers.

The Selma Lighting Company, Selma, Ala., will enlarge its electric plant, installing machinery, etc. A new building is being built.

J. R. Bunn and others will rebuild its lumber and planing mill, recently destroyed by fire, at Fairfax, Ga.

The Maxwell-Andersen Company, Marianna, Fla., will rebuild its lumber plant recently destroyed by fire with a loss of \$15,000.

The Kelly Company, Birmingham, Ala., which has secured extensive street car franchises, announces the probability of erecting a \$1,000,000 power and lighting plant.

The Sarasota Ice & Electric Company, Sarasota, Fla., R. E. Ludwig manager, will purchase equipment for a 200-hp. power plant.

The Polar Ice & Light Company, Tarpon Springs, Fla., now owned by the Southern Utilities Company, will enlarge its power plant. J. R. Crellin local manager.

The Daniel Mfg. Company, Birmingham, Ala., recently incorporated with a capital stock of \$50,000, has had plans prepared for the building of a factory and is now in the market for turret lathes, lathes, drill presses and motors; also brass and bronze small machinery castings, thumb screws, nuts and springs for the manufacture of brass, bronze and other metal parts pertaining to its patented specialties.

The Composite Brick Company, Jacksonville, Fla., will build a brick plant with an estimated capacity of 40,000 face and common brick. Full equipment of machinery will be required. E. R. Wood, secretary and treasurer.

The Mascot Stove & Mfg. Company, Dalton, Ga., will manufacture a patent range and enlarge its plant for that purpose. It will issue \$100,000 of additional stock.

The Gressner & Groh Electric Welding Company, New Orleans, La., will establish an electric welding plant for the repair of steamship boilers and other iron and steel work in Mobile, Ala.

The Thomas Lumber Company will establish a sawmill at Perrine, Fla.

T. R. Byrd and others propose to establish a rice mill at Hastings, Fla.

St. Louis

ST. LOUIS, MO., May 19, 1913.

Business in the machine tool market continues rather quiet, though the aggregate is of good proportions. No large lists are appearing, but good business in manufacturing lines brings a fairly steady demand for tools. There is some request for second-hand tools, but no specially striking characteristics attend this demand.

The Chicago & Alton Railroad announces plans for the construction of a freight-house at East St. Louis to cost about \$60,000 and to contain some mechanically operated equipment.

The waterworks filter equipment on which bids were sought by the city of St. Louis will be supplied by the Pittsburgh Filter Company, the contract having been awarded at a total cost of \$398,200.

The Indiana Reduction Company will build a garbage disposal plant under a contract which has been awarded it by the city of St. Louis. It will be of sufficient capacity to handle 50,000 tons minimum yearly and will cost, with equipment, about \$200,000.

The Westinghouse Electric & Mfg. Company, Pittsburgh, Pa., has acquired a site in St. Louis for a branch factory which, it is stated, will be built and equipped at once.

The Nu-Back Mfg. Company, St. Louis, has been incorporated with \$30,000 capital stock by E. V. Wilkinson, Adam Wiest and Harry F. Rapp, and will at once establish a plant for the manufacture of paints, enamels, varnishes, etc.

The Lake Shore Land Company, New Orleans, La., is having plans prepared for a pumping station to drains lands on the Bayou Couchon, near that city.

The City of Conway Light, Power & Water System, Conway, Ark., will install an additional unit under the

direction of E. V. Leverett, engineer, including a Corliss engine 18 x 36 in. and a 200 kva generator.

Plans are prepared for the installation by Greenway & Harvey, of Booneville, Ark., of a 225-hp. engine, seven motors of varying horsepower and a 150-kw. generator.

The Keystone Iron & Metal Company, St. Louis, Mo., has been incorporated with a capital stock of \$2,000 by W. J. Brennan, Charles G. Jenkins, Lillie Dribbens and Benjamin Dribbens. The company will deal in metals.

The Missouri School for the Deaf at Fulton, Mo., will build and equip a power house 97 x 98 ft.

The city of Albany, Mo., which recently voted a bond issue of \$19,000, will install an electric light plant, including power equipment, two generators, etc.

The Portageville Stave Company, Portageville, Mo., will equip a public service electric plant to be operated in conjunction with its stave plant.

The city of Hinton, Okla., is asking bids through the Benham Engineering Company, Oklahoma City, Okla., for the construction and equipment of an electric light and power plant.

Plans have been completed for the construction and equipment at Ingersoll, Okla., of an electric light and power plant of 2300 volt three-phase type.

J. N. Taylor and B. A. Little, of Okemah, Okla., have bought the electric light and power plant at McCurtain, Okla., and will remodel and re-equip it to a considerable extent.

P. F. Wright and others have acquired a franchise for the construction and operation at Wakita, Okla., of an electric light and power system.

The municipal authorities of Supply, Okla., have plans for a public service electric plant.

The Aylsworth-Neal-Tomlin Grain Company, Kansas City, Mo., has been incorporated with \$100,000 capital stock by Charles T. Neal, John R. Tomlin and George A. Aylsworth to equip a grain elevator and operate in the general grain business.

The city of Jackson, Miss., has authorized the construction of a municipal abattoir to cost about \$35,000.

The Fort Smith Excelsior Company, Fort Smith Ark., will rebuild and equip its excelsior manufacturing plant recently burned with a loss of \$10,000.

The Carbon Purifier Mfg. Company, Lake Charles, La., will equip a plant for the manufacture of purifiers and accessories under patents granted to W. H. Loy.

The Crescent Bed Company, Ltd., of New Orleans, La., will build a \$25,000 plant for the manufacture of iron beds.

A sawmill of 30,000 ft. daily capacity will be equipped at Eldorado, Ark., by the Hardwood Dimensions Company, Shreveport, La. J. W. Wilson, president.

A double band sawmill will be equipped at Pierre, La. (not a postoffice), by the Meridian Lumber Company, which is connected with the Crowell & Spencer interests of Long Leaf, La., and the Alexandria, La., Lumber Company.

George S. Leatherbury, Jr., Mobile, Ala., will replace the kilns and other equipment of the Green Lumber Co., of Bexley, Miss., in which he was interested when it was burned.

O. W. Sparks, Poplin, Mo., has plans for the equipment of a concentrating plant on mining land owned by him in that district.

The Eldorado Mining Company, Joplin, Mo., of which A. P. Ford, of Dyersburg, Tenn., is head, will build a 300-ton concentrating plant.

R. W. Banks, Jr., Gulfport, Miss., will equip a plant for the manufacture of a blade sharpening device and is reported in the market for mechanical equipment.

The Aero Swing Company, Hattiesburg, Miss., R. H. Hemphill, president, has plans for equipment of a plant for the manufacture of revolving swings.

The Liquid Carbonic Company has plans for a six-story bottling and distributing plant at Kansas City, Mo., to cost about \$100,000.

The Eagle Mfg. Co., Anadarko, Okla., recently incorporated by H. Otto, N. Hamilton and J. H. Miller, will equip a plant for the manufacture of clothes lines.

The Lafayette Motor Car Company, Lafayette, La., will build a machine shop, the equipment to cost about \$6,000.

The Alfalfa Food Products Plant and the Wilson Machine Company's plant, burned with a loss of \$15,000 at Jackson, Miss., will be rebuilt and re-equipped.

The Oklahoma Bed Springs Mfg. Company, Oklahoma City, Okla., is building a two-story plant, 75 x 140 ft., to meet the rapidly increasing requirements of its business.

Texas

AUSTIN, TEXAS, May 17, 1913.

One of the features of the machinery trade in Texas at this time is the heavy demand for cotton ginning apparatus. Indications point to the erection of more gins this season than in any previous year. Other lines of the trade are also very satisfactory.

The City Council of Taylor has granted a 30-year franchise to H. P. Ball, of Ann Arbor, Mich., for the erection and operation of a gas manufacturing plant.

The City Commission of Fort Worth has under consideration the installation of additional machinery and the making of other improvements to the municipal waterworks plant.

The Rockwall Light & Power Company, Rockwall, has been organized with a capital stock of \$25,000. The incorporators are Hiram Grosman, Mose Grosman, Wallace C. Woodlief, W. D. Austin and W. F. Leonard.

E. A. Green will erect a cotton gin at Rockdale. The Davidson-Bronstap Gin Company will install a cotton gin at Clifton.

The Edna Electric Light, Ice & Water Company will construct an electric light and waterworks plant and an ice factory at Edna. L. E. Ward, W. W. McCrory and Rudolph Linnartz are interested.

The Farmers' Gin Company will erect a cotton gin at Melissa. A. I. Shirley, S. H. Parris and J. B. Neal are interested.

The Murphy-Moolton Company is building a plant at Denison for the refining of asphalt. It will obtain the asphalt rock from extensive beds it owns in Oklahoma near Springtown. The new plant will have a capacity of 15 tons daily of refined material.

The Farmers' Gin Company will establish a cotton gin at Plano. John H. Carpenter is president.

Roy Sansome is erecting a plant at Quanah for the manufacture of mattresses and overalls.

The Hillsboro Petroleum, Oil & Gas Company will bore wells in the section around Hillsboro, in search of oil and gas. J. Q. Crisman is interested.

The Peoples' Gin Company will erect a cotton gin at Burk Burnett. W. C. Myers, B. F. Suter and R. A. Furlow are interested.

Meisner & Seybold are building a cotton gin at Temple.

The City Council of Cotulla has under consideration the erection of a waterworks plant and laying of a distributing system there. It will also put down an artesian well.

The Big Wells Gin Company will build a cotton gin at Big Wells.

E. A. Crawford, of Springfield, Iowa, and associates, are preparing to develop on an extensive scale a large talc deposit situated near Belton. Machinery will be installed for converting the material into powder and for mining purposes.

New machinery is being installed and other improvements made to the municipal waterworks and electric light plant at Brady.

The Planters' Oil Mill Company is preparing to rebuild its cotton-seed oil mill at Hearne, which was destroyed by fire a few months ago. The new plant will be much larger than the old one.

The Sherman Mill & Gin Company is enlarging its plant at Sherman at a cost of about \$40,000.

The Washington Ice Works is enlarging its plant and will install additional machinery at Sherman.

F. C. Holt and associates have definitely decided to erect a large cotton mill at Wichita Falls, instead of locating the plant at Paris, as was originally contemplated.

The Athens Fire Brick & Tile Company has adopted plans for a brick and tile plant to be erected at Athens at a cost of \$200,000.

W. L. Curry, of Pittsburgh, Pa., and associates, who own the Magistral mine in the Inde district, will erect an experimental ore treating plant at Inde, State of Durango, Mexico.

The Miami-Arizona Copper Development Company will erect an ore reduction mill at its mine at Miami, Ariz., when the development work that is now going on is further advanced.

The Float Plunger Pump Company, which has been organized by J. P. Dunnaway, of Deming, N. M., and associates, will erect a plant at Miami, Ariz., for manufacturing pumps.

It is authoritatively announced that the project of erecting a great hydroelectric plant and the construction of an extensive system of power transmission lines to cover parts of Arizona and New Mexico has been financed and that details of the organization of

the company will soon be made public. It will be located at some central point, probably on the Gila River. Power will be furnished for operating the machinery of the mines, ore reduction mills and pumping plants.

The Pacific Coast

SAN FRANCISCO, CAL., May 13, 1913.

The movement of machine tools is fairly satisfactory at the moment, with some indications of increasing activity for the immediate future. Railroad buying is again in evidence, and a good many orders for single tools and small groups are coming from the larger shops, while the country garage trade furnishes a very considerable share of the business. Figures are being taken on several installations of more or less importance, on which orders may be placed within the next few weeks. Local dealers and agents anticipate a large amount of Government business for improvements at the Mare Island Navy Yard, as well as for the conversion of the collier Prometheus into a repair ship, in which machinery amounting to about \$200,000 will be used. The market for all lines of machinery is beginning to feel the effect of financial conditions throughout the country. Machinery dealers show more reluctance than usual to extend credit, especially for new enterprises, and increasing difficulty is experienced in getting money either for new work or for the completion of projects already under way. Work has been curtailed somewhat on hydroelectric development, and some other development planned for this summer is proceeding less rapidly than was expected. The demand for contractors' machinery in general, however, is keeping up extremely well, and there is more than usual activity in the larger mining districts. Sales of road rollers and other highway equipment are increasing. Pumps, both for waterworks and irrigation purposes, are in strong demand.

The Southern Pacific Railroad has rather unexpectedly placed orders for a number of tools for its shop at Tucson, Ariz., the principal items being three Lodge & Shipley lathes, one 14 in. x 10 ft., and two 16 in. x 10 ft., a No. 2 Hilles & Jones punch and shear and a 2½ x 26-in. Pratt & Whitney turntable lathe, all with motor drive.

The Moore & Scott Iron Works, this city, is preparing to remove its machine shop from Main and Howard streets to a site adjoining its boiler shop on Second street, near Townsend, and has ordered a Shaw electric crane.

A 35-ton Shaw crane has been ordered for the Bakersfield, Cal., plant of the San Joaquin Light & Power Company.

The American Iron & Brass Foundry, Los Angeles, has been incorporated with a capital stock of \$20,000 by H. H. and A. Hague and H. L. Kirsch.

The Oakland, Antioch & Eastern Railway has placed orders locally and in the East for 16 new cars, and is now getting some large motors and special cars. The road is being equipped throughout with a block signal system.

The Standard Gas Engine Company is moving its city office from 10 California street to the corner of Drumm and California streets.

The Western Foundry Company, San Francisco, has been incorporated with a capital stock of \$50,000 by J. E. Cope, J. and P. Hedley.

Boden's Automatic Hammer Company, San Francisco, has been incorporated with a capital stock of \$500,000 by C. S. Boden, H. S. Goold, R. J. Graf, H. F. Morris and H. M. Anthony.

Wright & Van Buskirk, Lodi, Cal., plan to install an oxy-acetylene welding plant.

The city of San Diego is taking figures on a water-works pumping outfit.

R. A. Detson is preparing to start a plant at Oroville, Cal., for the manufacture of irrigation pipe.

Fresno County, Cal., is taking figures on a power plant for the county buildings, the estimated cost being about \$26,000.

Arrangements are being made for the installation of electrical machinery in the Tulare Mining Company's plant near Porterville, Cal.

Considerable business in pneumatic drills and other mining equipment is coming from the new town of Rochester, Nev. Plans have been completed for the first unit of an ore mill, a 10-stamp outfit with a daily capacity of 50 tons, with a tube mill and cyanide plant.

The Tuolumne Lumber Company is preparing to add a lot of machinery to a mill it has purchased at Hughson, Cal.

The town of Oxnard, Cal., will take bids May 27 for the construction of a municipal water plant.

It is reported that a lot of new machinery will be installed by the Mother Lode Mining Company, near Brownsville, Cal.

Among the inquiries now out for highway equipment are the following: Santa Rosa, Cal., a grader; San Jose, Cal., an asphalt plant. The town of Santa Rosa has ordered an Austin gasoline roller, and the town of Monrovia has ordered a Case steam roller, a grader and a rooter. The Casa Grande, Ariz., Water Users' Association has purchased an Austin excavator for canal work.

Eastern Canada

TORONTO, ONT., May 17, 1913.

The Electric Repair & Contracting Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000, by George Edward Matthews, Westmount, Que., Robert Urquhart, Ulric Antoine Leduc, Ralphe Frederick Stockwell and Edson Grenfell Place, Montreal, to manufacture and buy electrical appliances.

Toronto capitalists have completed arrangements for a 76-ton bleached sulphite mill on the Grand Trunk Pacific Railway, west of Cochrane, Ont. The company has 30,000 hp. available.

The Benedict Mfg. Company, Syracuse, N. Y., has founded a branch at Toronto, to manufacture silver plate, bronze, brass and metal goods. The company has secured a factory at 32 Church street, and machinery is being installed. The Canadian company will be known as the Benedict, Proctor Company, Ltd.

The Dominion Wire Cloth Mfg. Company, Ottawa, Ont., will build a \$15,000 addition to its factory.

The Dearborn Chemical Company, Chicago, will build a \$40,000 factory at Dundas, Ont.

The Volt Electric Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Daniel Francis Pierce, James Joseph Kenny, John Ernest Anderson and Leopold Macaulay, of Toronto, to manufacture, buy and sell electrical appliances and devices.

The Canadian Lamp & Stamping Company, Ltd., Walkerville, Ont., has been incorporated with a capital stock of \$100,000.

The Vilter Mfg. Company, a Wisconsin concern, has secured an Ontario charter. It makes steam engines and special machinery.

The Swedish Crucible Steel Company and the Vincent Steel Process Company, both of Detroit, will erect plants at Sarnia, Ont.

The sales office of the John Deere Plow Company is being moved to Toronto, but the head office of the company will remain in Welland, Ont. Several additions to the Welland plant will be made this year.

The City Council of Berlin, Ont., has voted to grant A. S. Gourlay, of Galt, Ont., a site for the erection of a shoe factory.

The Brunswick-Balke-Collender Company, Toronto, will build a 4½-story factory on Hanna avenue, at a cost of \$60,000.

The Mentholatum Company, of Buffalo, N. Y., will build an \$18,000 factory at Bridgeburg, Ont.

The ratepayers of Goderich, Ont., will vote on a loan grant of \$20,000 to the Rice-Knight Mfg. Company. If the loan is made the company will erect a plant and 50 dwellings for employees.

The Chicago Bridge & Iron Works has purchased a seven-acre site at Bridgeburg, Ont., and is building a temporary building 60 x 100 ft. Permanent buildings will be built later. C. C. Gregory is manager.

The Canadian Drawn Steel Company, Hamilton, Ont., will make a large addition to its plant.

J. S. Gibbon & Co. are having plans prepared for widening the wharf on its premises and erecting upon it a fireproof steel coal elevator building. This will be equipped with the most modern handling apparatus.

The W. E. Dillon Company, Toronto, manufacturer of sheet metal goods, will build a four-story factory on George street.

The ratepayers of Trenton, Ont., have passed a by-law granting a fixed assessment to the Canada Creosoting Company, which will build a \$250,000 plant.

Canadian Drednot Motor Trucks, Ltd., Montreal, is making an issue of preferred stock for the purpose of erecting a much larger factory than it at present occupies.

The Corey Needle Company, Upper Bedford, Que., manufacturer of latch needles, recently installed a number of new automatic machines and further extensions are being made to the plant.

May 22, 1913

The repair shops of the Lake Erie & Northern Railway will be located at Brantford, Ont. It is understood that employment will be given to 40 or 50 men.

The Bell Thread Company, Ltd., Hamilton, Ont., is extending its plant and is in the market for additional dyeing machinery.

The Canada Label & Webbing Company, Ltd., 9 Morrow Lane, Toronto, Ont., is erecting a one-story brick addition to its plant.

The Renfrew Electric Mfg. Company, Ltd., Renfrew, Ont., has been incorporated with a capital stock of \$50,000, to manufacture and deal in electrical machinery. The provisional directors are Joseph Vaughn, Ernest Buck and John J. Osborne, of Ottawa.

The Lindsay Machine & Tool Company will remove from Peterborough, Ont., and establish a plant at Lindsay for the manufacture of special machinery.

The Moffatt Stove company, Weston, Ont., has completed plans and let contract for a three-story molding shop and nickel-plating shop, to cost \$25,000, at its plant on Dennison avenue.

The London Pressed Brick & Tile Company, Ltd., recently incorporated with a capital stock of \$100,000, is building a plant which will have a daily capacity of 22,000 bricks. The machinery equipment will be furnished by the Berg Machinery Company, Toronto.

The Stratford Milling Building Company, Stratford, will build a plant for the manufacture of flour mill machinery. The plant will cost \$60,000.

The Dominion Steel Castings Company, Ltd., Hamilton, Ont., is making a number of additions to its plant. These include the erection of a 65 x 140-ft. addition to the cleaning room, the building of a second open-hearth furnace and two additional drying ovens and the addition of two overhead cranes, a Newton cold sawing machine, a Sly sand-blast equipment and two jarring and one rock-over molding machine.

Western Canada

WINNIPEG, MAN., May 16, 1913.

Considerable activity prevails in most of the leading cities west of the Great Lakes, although the financial tightness no doubt keeps business from being as active as it otherwise would have been. The demand for machinery in the week was not brisk, but there was a steady movement of various lines. The lumber mills of British Columbia are making considerable improvements and many are extending their plants this season. Municipal corporations are good purchasers of supplies for water works, electric light and gas plants and other utilities.

Ruggles, Winters & Huntington are installing a plant at North Battleford, Sask., for the manufacture of Shope patent facing bricks.

The Kamloops-Vancouver Meat Company, Ltd., is planning to erect a \$100,000 packing and cold storage plant at Kamloops, B. C., this summer.

The Western Canada Flour Mills Company, Ltd., Winnipeg, has purchased the flour mills, oatmeal mills and grain elevators of the Brachman-Ker Milling Company, Ltd., in Alberta and British Columbia. The new owners will increase the capacity of the flour mill at Calgary to 1500 barrels per day.

It is announced that the Grand Trunk Pacific Railway Company will soon begin work on the construction of a 10,000,000-bushel grain elevator at Prince Rupert, B. C., the terminus of the road at the Pacific Coast.

The Saskatchewan Mfg. Company will soon start to build a plant in Saskatoon, Sask., for the manufacture of farm machinery. P. S. Houghton, of Crookston, Minnesota, is the promoter of the company, which has a capital stock of \$200,000.

Cornwall & Gauthier, Athabasca Landing, Alberta, are building a sawmill at Mirror Landing, Alberta.

The Crossing Lumber Company, Minaki, Western Ontario, is repairing its sawmill, and will build a new and larger plant next year.

The Howe Sound Lumber Company, Ltd., Vancouver, B. C., will build a sawmill at Squamish, about 30 miles from Vancouver.

Robert McNair, Vancouver, B. C., is the head of a concern that is building a shingle mill at Port Moody, B. C.

The Phoenix Mfg. Company, Eau Claire, Wis., manufacturing sawmill machinery, logging tools, road machinery, tractors, engines, etc., has made a connection whereby the products will be manufactured in Canada for consumption in the Dominion. A new corporation has been organized at Moose Jaw which will specialize in road and field tractors and logging locomotives.

The Imperial Iron & Steel Company has received a grant of 30 acres and will erect a rolling mill and horse shoe factory at Prince Albert, Sask.

A \$100,000 brick plant, which will be the largest pressed brick plant in the West, is to be installed at Taber, Alta., by the Canada West Coal Company. Work will be started in two weeks. The capacity of the plant will be 100,000 pressed brick per day.

Tenders have been called for the preliminary work in connection with the construction of the \$300,000 plant to be built in Weyburn, Sask., by the Cleveland Mfg. Company. The company has secured a site in Avondale comprising six acres. Among the articles manufactured there will be stoves and furnaces, cream separators and pipe wrenches. Electric welding, nickel plating and drop forging will also be engaged in. It is proposed to operate the plant with electric power and the company will install its own dynamos.

The City Council of Calgary, Alberta, will call for tenders for buildings and machinery to the amount of \$320,000 to increase the capacity of the municipal power plant.

Harry Stephens, Portage La Prairie, Man., contemplates establishing brick making plants at Edmonton and Calgary, Alberta.

It is reported that the Grand Trunk Pacific Railway Company will install a power plant at Regina, Sask., to supply power for its station and for the hotel which it proposes to erect in the near future.

Government Purchases

WASHINGTON, May 19, 1913.

The Bureau of Yards and Docks, Navy Department, Washington, will open bids June 21 for furnishing electric traveling cranes for the general foundry, navy yard, Puget Sound, Wash. The amount available is \$19,000. The same department will open bids June 14 for furnishing and installing three electric hoists at the United States naval radio station, Radio, Va.

Canal Circular No. 776, of the Isthmian Canal Commission, Washington, calls for bids to be opened June 5 for a quantity of miscellaneous equipment, including a two retort crematory, switches, frogs, steel and galvanized pipe, lead pipe, small tools such as twist drills, stocks and dies, etc.

The daily consular reports issued by the Bureau of Foreign and Domestic Commerce, contain a number of foreign trade opportunities, abstracts of which follow:

No. 10,900—An American consul reports that a local company engaged in the manufacture of projectiles and war material is in the market for machine tools to the extent of \$260,000. The company desires to buy direct from manufacturers and prefers American machinery.

No. 10,901—An American in a European country has had inquiries for heavy oil motors from a local business man who desires to communicate with American manufacturers.

No. 10,902—A business firm in a Mediterranean country desires catalogues and prices of American manufacturers of agricultural implements.

No. 10,905—The town clerk of Johannesburg, South Africa, will open bids June 13 for supplying gas retorts, horizontal, vertical or other type steel work, etc., for the complete erection of a gas plant.

No. 10,915—An American consul in a European country has been informed that there is a large market in that country for rubber manufacturing machinery differing slightly from that now in use. American manufacturers can obtain specifications and plans of machinery desired upon application.

No. 10,919—A commercial agent of the Department of Commerce reports that the owners of several large oil mills in a European country are planning to remodel some of the plants with a view to more economical working. Automatic machinery is desired to take the place of the present hand methods.

No. 10,923—The Department of Commerce has received a cablegram from an American consul to the effect that the director of an arsenal in his district desires proposals with designs for furnishing equipment complete for the manufacture of 100 rifles.

No. 10,925—An American consul in a Latin-American country states that certain railroads in his district are in the market for two locomotives.

No. 10,927—The secretary of a foreign corporation has requested an American consul to obtain the names of American manufacturers of hand machines for the abstraction of fiber from the leaves of the sisal plant.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids May 13 for furnishing one steam pressure disinfecter as follows:

Bidder 4—American Sterilizer Company, Erie, Pa., class A—\$744.75, class B—\$768.75, class C—\$894.75; 71, Kensington Engine Works Company, Philadelphia, Pa., class A—\$675, class B—\$691, class C—\$795.

Schedule 5374, class 131, one motor-driven planing machine—Bidder 48, Garvin Machine Company, New York, \$1,320; 31, Hill, Clarke & Co., Boston, Mass., \$1099; 78, Manning, Maxwell & Moore, New York, \$1,308; 92, Niles-Bement-Pond Company, New York, \$1,493; 98, Ohio Machine Tool Company, Kenton, Ohio, \$1,365; 139, Whitcomb-Blaisdell Machine Tool Company, Worcester, Mass., \$1,296.

Schedule 5365, class 132, one electric conveyor—Bidder 95, Northern Engineering Works, Detroit, Mich., \$3,450.

Class 133, one standard four-screw type testing machine—Bidder 116, Riehle Brothers Testing Machine Company, Philadelphia, Pa., \$3,495; 135, Tinium Olsen Testing Machine Company, Philadelphia, Pa., \$4,000.

Schedule 5336, class 141, four tool room engine lathes—Bidder 6, Alexander & Garsed, Charlotte, N. C., \$689; 13, F. A. Branda & Co., New York, \$950; 68, Kemp Machinery Company, Baltimore, Md., \$946; 78, Manning, Maxwell & Moore, New York, \$1,100; 113, Pratt & Whitney Company, Hartford, Conn., \$988.

New Tools and Appliances

This is essentially a news department for which information is invited

Riveting Hammer.—The Ingersoll-Rand Company, 11 Broadway, New York City, is making a riveting hammer in which the valve chamber is independent of the piston chamber, thus enabling pistons of different lengths to be used without danger of causing valve breakage. A single-lever throttle with a long bearing is provided for the handle, which is attached to the cylinder by two bolts that are parallel to the sides of the cylinder. In this way the handle is locked to the cylinder, and it is not necessary to use a vise or other mechanical appliance for holding the tool when taking it apart or assembling it. Two sizes of hammer, having strokes of 6 and 8 in., are made for driving rivets up to a maximum diameter of $\frac{7}{8}$ and $1\frac{1}{4}$ in. respectively.

Milling Machine with Quick Power Table Traverse.—The application of power rapid traverse to the table has been made by the R. K. LeBlond Machine Tool Company, Cincinnati, Ohio, to its heavy duty cone type milling machine, which was illustrated in *The Iron Age*, August 29, 1912. This improvement insures a reduction in the amount of time ordinarily lost in non-productive motions and also cuts down the physical effort required of the operator. The mechanism by which these results are obtained is built into the feed mechanism and is thus an integral part of the machine. A belt passing over a separate pulley on the countershaft and the pulley on the feed box runs at a constant high speed which is calculated to give a table travel of 3 ft. per min., irrespective of the rate for which the feed box is set. Power is carried to the reverse box by a separate universal shaft so placed that it never assumes a dangerous driving position. This shaft is carried through an intermediate bearing and the splined shaft that drives the feed is always horizontal. A pair of spiral gears carry the power into the tumbler frame, and the regular feeds are transmitted through a similar pair of spiral gears, driven by a splined shaft parallel to the quick traverse shaft. This mechanism is readily controlled by the operator without leaving his regular position.

New Milling Machine Fixture.—For meeting the requirements of square or hexagonal straddle milling, the Garvin Machine Company, Spring and Varick streets, New York City, has designed a milling machine fixture in which four V-slots are milled in the body of a 4-in. universal chuck. The fixture is provided with means for taking up wear and has a capacity of from $\frac{1}{4}$ to 1 in. Its weight is approximately 30 lb.

Vertical File for the Drafting Room.—For filing blue prints, drawings, tracings, etc., flat, and at the same time indexing them so as to be located readily, the Yawman & Erbe Mfg. Company, Rochester, N. Y., has brought out a vertical file. There are twenty pockets hung on lateral supports and held tightly together when the cabinet is closed. These pockets swing loose when the file is opened and can be easily lifted out, or the prints can be removed without lifting out the folders. The front of the cabinet when opened forms a flat table for examining the drawings.

Semi-Automatic Drilling Machine with Five Spindles.—The Grant Automatic Machine Company, Detroit, Mich., has recently developed a semi-automatic drilling machine, consisting of five horizontal drill spindles, which are positively fed by cams and are timed so as to permit one operator to handle the work of all five. The main shaft is driven by a three-step cone pulley and operates the spindle through spiral gears, while the camshaft is operated through a three-step cone pulley and planetary gears. The cam for feeding the spindles is in contact with a hardened and ground roll, attached to the bottom of a slide which operates the spindle. Ordinarily the machine is equipped with universal vises for holding bar work and an oil pump for forcing the oil from a reservoir in the bed to a tank above the work. The capacity of the machine is drills up to $\frac{3}{4}$ in. in diameter and the maximum depth of hole is $1\frac{3}{4}$ in.

Case Hardening Boxes.—A line of case hardening boxes which are made in a variety of sizes and styles has been developed by the Hess Steel Casting Company, Bridgeport, N. J. The boxes are made of low carbon stock, melted in crucibles, the resulting composition being practically

identical with wrought iron. The walls are from $\frac{3}{16}$ to $\frac{1}{4}$ in. thick, thus making the boxes light. It is claimed for them that they resist warping, scaling and the common tendency to sponginess.

Machine for Testing Hardness.—A recent product of the Pittsburgh Instrument & Machine Company, Pittsburgh, Pa., is a hardness testing machine which operates on the Brinell principle. An hydraulic press with a downwardly acting ram, carrying a ball 0.4 in. in diameter, which is pressed into the object to be tested, comprises the machine. An adjustable table that is held in place by a 6-in. bronze handwheel supports the test object. Tool steel is employed for the ram, which works without packing, and heavy cylinder oil is used as the pressure fluid, a small hand pump generating the pressure, which can be read from the gauge. About 10 strokes of the pump are required to produce a pressure of 6000 lb., and in testing iron and steel the pieces are subjected to this pressure for about $\frac{1}{4}$ min. The valve is then opened, and the oil re-enters the reservoir and releases the test piece. The ball impression is then measured by the use of a specially constructed microscope and the corresponding hardness number found from the table. The accuracy obtained is within 0.001 in.

Cutter and Reamer Grinding Machines.—For grinding straight or spiral milling cutters, face and end mills and straight or taper reamers, the Union Twist Drill Company, Athol, Mass., has brought out a new grinding machine. By the use of suitable fixtures it is possible to sharpen face mills and the side teeth of side mills and the end teeth of end mills. The capacity of the machine is cutters up to 12 in. in diameter or reamers up to 24 in. long. A cup wheel is mounted on a hardened and ground vertical steel spindle, which runs in boxes, having an adjustment to compensate for wear. The form of wheel used gives a flat clearance and a stronger cutting edge than that resulting from the use of a disk wheel. The machine is belt driven from a countershaft at a speed of 700 r. p. m. and weighs about 1500 lb.

Friction Head Screw Machine.—A recent product of the F. E. Wells & Son Company, Greenfield, Mass., is a friction head hand screw machine. The friction head gives a wide speed range, and it is possible to drive the machine from a countershaft or by an electric motor, the power being transmitted through spiral gears. Quick speed changes are provided, and a quick reverse is also available for running off when tapping or threading.

Broaching Machine.—The J. N. Lapointe Company, New London, Conn., has recently added a No. 4 broaching machine to its line. It is driven by a pulley 22 in. in diameter with a $4\frac{1}{2}$ -in. face, and the driving screw, which has a pitch of 1 in. and a stroke of 65 in., is $3\frac{1}{4}$ in. in diameter. Two speed changes are provided by gears running in an oil bath, and the driving spindle is protected by a telescopic screw at the rear of the machine. To avoid heating of the screw and nut when doing heavy work, the machine has a ball thrust bearing, and provision is made for attaching special fixtures under the front end of the machine. An oil pump and an automatic brake which stops the machine with but little overrun of the sliding head are included.

Tube Rolling Machine.—A tube forming machine, which is used for rolling tubes into the proper shape for having the joints brazed, is a recent product of the Etna Machine Company, Toledo, Ohio. The ribbon stock from which the tubes are made is fed between the forming rolls, of which there are five sets, and in passing between the successive pairs, the stock is formed to the required shape.

Upright Drilling Machine with Positive Gear Feed.—A 24-in. upright drilling machine equipped with a positive gear feed has been placed on the market by the Aurora Tool Works, Aurora, Ind. The feed has automatic stops and six changes, ranging from 0.0060 to 0.0039 in. per revolution of the spindle, are available. The machine possesses high drilling capacity, which is said to be due to the size and width of the belt and also to the fact that the power is applied in a simple and direct manner. The construction of the various parts is massive and the machine possesses great rigidity. The table is raised and lowered by a rack and pinion and is locked by clamping screws, the maximum distance from the table to the end of the spindle being $3\frac{1}{2}$ in.

Trade Publications

Punches and Metal Working Machinery.—Cleveland Punch & Shear Works Company, Cleveland, Ohio. Handbook No. 5. Shows machines and small tools for the fabrication of iron and steel and includes information for the use of fabricators and suggestions as to standardization of equipment. The various sizes and styles of chisel blanks and rivet sets, pneumatic hammers, beading tools, punches, dies and other small tools, which the company is prepared to make a yearly contract for, are all illustrated and condensed dimension tables are included. Mention is also made of a line of metal working machinery, which includes punching machines of various types, angle and bar shearing machines, bending rolls, planing and shaping machines and a wall radial drill. Among the machines illustrated and briefly described is a large, open gap shearing machine, an illustrated description of which appeared in *The Iron Age*, June 27, 1912.

Welding Goggles and Protection Glasses.—William C. Adams, 332 Boylston street, Boston, Mass. Catalogue. Deals with a line of goggles and protection glasses for those who operate metal welding and cutting machines. A number of different styles are made, all of which are illustrated and briefly described. The goggles are regularly furnished with dark smoked glass of a greenish tint, but amber or clear white glass can be supplied if desired.

Pneumatic Tools.—Cleveland Pneumatic Tool Company, Cleveland, Ohio. Catalogue No. 12. This is the company's 1913 catalogue, illustrating and describing a complete line of hammers; drilling, flue rolling, tapping, boring, grinding and buffing machines, mold rammers, etc. Condensed specification tables and views of the various tools with the parts numbered for convenience in ordering repairs are given, and in addition to the views of the tools themselves, there are engravings showing them in actual use.

Molding Machines.—Osborn Mfg. Company, Cleveland, Ohio. Catalogue No. 142. Describes and illustrates the extensive line of Osborn molding machines and molding machine accessories. It is stated that this line of machines is so complete that it covers all of the requirements of the modern foundry. Considerable space is devoted to a description of the line of direct draw roll-over jolt machines, attention being called to the wide range of practical use of this line. Several illustrations of work on foundry floors are given. One, used as a frontispiece, shows a group of castings of various kinds including much difficult work made with the use of the Osborn machines at the Allegheny plant of the Westinghouse Electric & Mfg. Company!

Endless Belt.—Brophy Belting & Supply Company, Madison, Ind. Mailing card. Concerned with an endless, woven cotton belt, for high speed, sensitive machinery. The belt is made of seine twine, and one of the fields for which it is especially designed is the driving of cylindrical grinding machines.

Rope Drives.—Dodge Mfg. Company, Mishawaka, Ind. Booklet entitled "Main Engine Drives." Contains a few illustrations of belt drives which have been converted to rope drives by the application of Dodge hardwood lagging. A number of testimonial letters from companies where this type of drive has been installed are reproduced.

Heavy Forgings.—Tate, Jones & Co., Inc., Pittsburgh, Pa. Bulletin No. 2. Gives considerable information on the subject of heavy forgings in as brief and concise a manner as possible. The text is supplemented by illustrations of forging presses and furnaces for heating the material to be forged and illustrations of various forged pieces.

Speed Recorder.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Catalogue No. 42. Refers to the Boyer railway speed recorder and contains a description of the device, together with instructions for applying and operating it. This device is mounted on the locomotive and gives a graphic record of the speed at which the train passed any point on the road, the number and location of stops, and the distance and speed of any backward movement that may have been made. Views of the recorder with the various parts numbered for convenience in ordering repairs are shown, together with its location on the engine.

Exhaust Fans.—Buffalo Forge Company, 490 Broadway, Buffalo, N. Y. Catalogue No. 256. In addition to illustrating and describing the various types of exhaust fans, the catalogue includes considerable information on the design and layout of exhaust systems for woodworking and machine shops, textile mills, cotton gins, etc. Data on the proper construction of hoods and the rules for determining their size under varying requirements are given. Tables of the sizes of pipe required for woodworking machines, buffering wheels, tumbling barrels, etc., and complete rules for figuring the diameter of the main suction pipes of the exhaust fans are included. Information on the collection of refuse, kinks for installing an exhaust system and a résumé of state laws are included.

Coal and Coke Crushers, Elevators and Feeders.—Robins Conveying Belt Company, 13 Park Row, New York City. Bulletin No. 51. Points out the advantages of using an adjustable coal and coke crusher. Views of the machine are given, together with a table of dimensions. Mention is also made of the use of the DeMayo unloading elevator for coaling vessels and a shaker feeder and a duplex shaking screen. A chart showing the horsepower required by a fully loaded horizontal belt conveyor is also included.

Reinforced Concrete Chimneys.—Weber Chimney Company, 1452 McCormick Building, Chicago, Ill. Pamphlet. Illustrates

the Weber conform chimney, which is used in connection with all types of boilers for all kinds of copper, zinc, lead and other smelting purposes, heating and ventilating, malleable iron and glass furnaces, garbage incinerators, etc. A brief description of the construction of the chimney and its advantages is given, but the greater portion of the pamphlet is made up of engravings showing the chimney in process of construction and also completed at a number of different industrial plants. A partial list of users, arranged alphabetically by states and towns, with the dimensions of the chimneys, completes the pamphlet. An illustrated description of some of the earlier chimneys built by this company appeared in *The Iron Age*, February 10, 1910.

Boilers.—Heine Safety Boiler Company, St. Louis, Mo. Pamphlet. Calls attention to some of the various large industrial plants where these boilers have been installed by a reproduction of several well-known trade marks on the cover. In the body of the pamphlet are reprinted a number of advertisements, each one referring to one of the trade marks shown on the cover and giving the character and size of the boiler equipment in use by the company. Mention is also made of the Heine superheater, which was illustrated in *The Iron Age*, June 12, 1912. The important advantages claimed for this type of superheater are close temperature regulation, absence of necessity for flooding, the impossibility of danger from excessive superheating, etc.

Vertical Air Compressors.—The Gardner Governor Company, Quincy, Ill. Circular G-R 2. Illustrates and describes the Gardner-Rix line of vertical air compressors, which are built with few parts and have no outside adjustments. Some of the special features of the compressor are automatic lubrication, small floor space, high speed and the enclosure of all working parts. After a brief description of the general features of the compressor, the various types are shown and a table of condensed specifications is given. Mention is also made of a line of horizontal compressors and views are given showing possible arrangements of the apparatus. An illustrated description of the vertical compressor appeared in *The Iron Age*, July 18, 1912.

Turbine-Driven Pumps.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Mailing card. Calls attention to a pumping unit consisting of a steam turbine direct-connected to a centrifugal pump which possesses the advantages of simplicity of design, compact construction and economical operation, together with ready accessibility for the purpose of repairs and inspection.

Gas Engines.—Producers' Supply Company, Franklin, Pa. Folder. Gives general descriptions and specifications for a new gas engine. Some of the parts are illustrated and three views are given of the complete engine. Among the advantages claimed for the engine which is built in sizes ranging from 10 to 30 hp. are economical use of gas and oil and the requiring of but little attention.

Counters.—Bristol Company, Waterbury, Conn. Bulletin No. 169. Devoted to a line of counters for automatically counting and registering revolutions or strokes, thus measuring the production of machines accurately and saving the waste of time spent in counting by hand or weight. One of the counters illustrated is a set back counter, having a capacity up to 1,000,000, which can be set back by one turn of a key. Mention is also made of the mechanical and electrical time recorders which were illustrated in *The Iron Age*, November 21, 1912, and a long distance recording tachometer.

Machine Tool Control.—Monitor Controller Company, 111 South Gay street, Baltimore, Md. Pamphlet. Calls attention to the Monitor system of machine control, which consists of a controller and one or more control or switch stations. This system can be applied to machines of all kinds and engravings show it applied to a reversing planing machine, a boring mill and a routing machine. The operation of the system is described at length, together with the various types of controllers and control stations which can be furnished, the text being supplemented by numerous illustrations.

Of interest, as showing the gradual development of small streams for the local use of power, is the hydroelectric plant which is being put in by the Andrew Terry Company, manufacturer of castings, Terryville, Conn. Use is made of an old dam on a nearby river located half a mile below the factory, which will have a 36-ft. head. The prime mover, designed for 130 hp., consists of a pair of 12-in. wheels built by the S. Morgan Smith Company, York, Pa., operating at 720 r.p.m., direct connected to a Westinghouse five-phase generator rated at a maximum of 135 k.v.a. and delivering current at 2400 volts. With this water-power it is believed that there will be no demand upon the steam power plant except for a few weeks in midsummer.

The Williams Foundry & Machine Company, Akron, Ohio, in carrying out a profit-sharing plan, distributed \$1500 among its employees May 10. Of this sum \$500 was divided among the non-salaried employees according to length of service with the company for more than one year, and \$1000 was divided according to the number of hours worked during the year regardless of the amount earned.

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